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THE

FLORA SYLVATICA

FOR

SOUTHERN INDIA:

CONTAINING QUARTO PLATES OF ALL THE PRINCIPAL TIMBER TREES IN SOUTHERN INDIA AND CEYLON, ACCOMPANIED BY A BOTANICAL MANUAL, WITH DESCRIPTIONS OF EVERY KNOWN TREE AND SHRUB, AND ANALYSIS OF EVERY GENUS NOT FIGURED IN THE PLATES.

BY

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CAREYA ARBOREA. (Nat. order Myrtaceæ.)

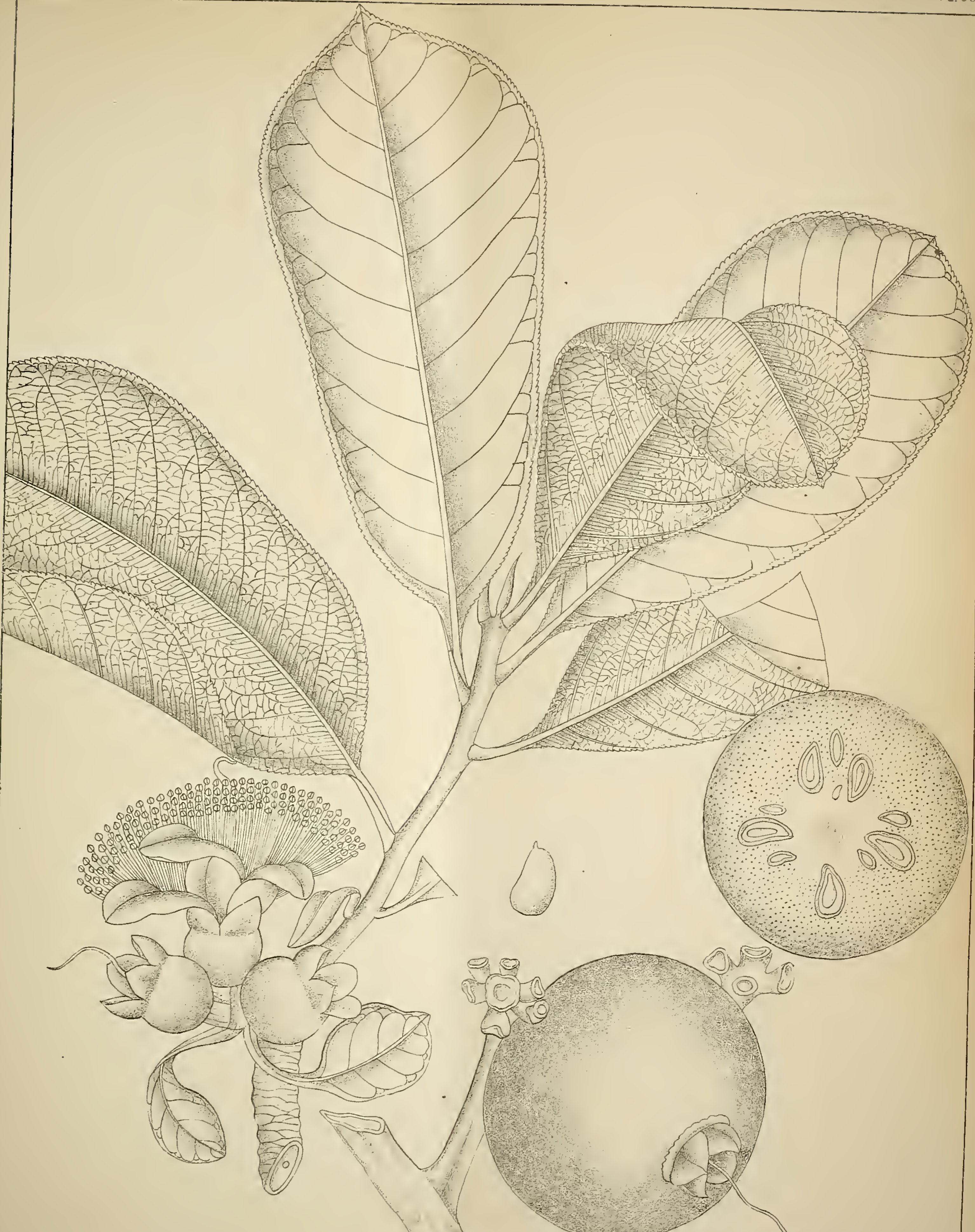
CAREYA, *Roxb.*—GEN. CHAR. Calyx-tube thick turbinate or ovoid not produced above the ovary, limb deeply 4-lobed, petals 4 spreading; stamens very numerous inserted in many series on the thick concave disk, free, filaments long filiform, the exterior longer and the interior shorter ones or both without anthers, the middle ones antheriferous, anthers small versatile, cells parallel debiscing longitudinally, ovary inferior 4-5 celled thick and fleshy, style elongate, stigma subcapitate obscurely 4-lobed, ovules numerous in the cells minute, superposed in 2-6 series on the central placenta, berry globose furnished with a rind (formed by the calyx) crowned with the limb of the calyx, seeds numerous nestling in fleshy pulp, and irregularly scattered, testa thick, embryo indivisible, cotyledons none. Large trees or in one instance a herb, leaves alternate crowded towards the apex of the branches penniveined serrated not dotted, flowers large yellowish, white or red sessile or forming a short spike or raceme or pedicellate and somewhat corymbose.

CAREYA ARBOREA. (Roxb.) A very large tree, leaves obovate or oblong slightly serrulate firm and glossy obtuse-pointed 8-12 inches long by 4-7 broad, stipules very minute deciduous, flowers sessile in terminal short few flowered spikes, large, fetid, yellowish white in color, calyx, corol, &c. as in the generic character, berry globose or broadly ovate and with the seed, &c. as in the generic character. *Roxb. Fl. Indica* ii. *p.* 638. ? Careya sphærica, *Roxb. Fl. Indica* ii. *p.* 636.

This large tree is common throughout the Presidency from the plains up to 5000 *feet, and is very abundant over the grassy parts of Wynad, Mysore, Coorg, &c., at an elevation of* 3000-4000 *feet, and it is also found in Ceylon, Birmah, N. Australia and Queensland. I much doubt if the C. sphærica of Roxb. is distinct; at least there is only one species (besides the little C. herbacea) in this Presidency; it is called Kumbi in Canarese, and Budà-darmee and Dud-ippi in Teligu, Aymà in Tamil in Tinnevelly, and Cahaata in Ceylon. The bark is very astringent and is used medicinally and for tanning, and it furnishes a coarse cordage; the wood is tough, strong, and durable, close and even grained, but inferior to teak in its direct cohesive strength, admits of a fine polish, red colored, resembling mahogany, a cubic foot unseasoned weighs* 60-63 *lbs. and* 50 *lbs. when seasoned, and its specific gravity is* ·800. *It is used for posts of houses and cart framing, and (as it stands water) for the edging of wells, and it is well adapted for furniture and cabinet purposes and is a favorite wood in some parts for charcoal; cordage manufactured from its bark is used as a slow match. The tree flowers in April generally when destitute of leaves.*

Not having specimens of this tree at hand, the figure has been taken from Dr. Wight's Illustration; analysis will shortly be given in the analytical plates.

PL. CCV



Govindo del

Dumphy Lith

Careya arborea (Roxb.)

MEMECYLON UMBELLATUM. (Nat. order Melastomaceæ.)

MEMECYLON. *Linn.*—GEN. CHAR. Calyx-tube hemispherical or campanulate, the limb entire or obtusely 4-lobed, rarely 5-lobed, plane inside or radiately 8-winged. Petals 4 or rarely 5, ovate or orbicular. Stamens twice as many as petals, all equal and similar; anthers short, with a thick connective, forming a conical spur at the base, the cells opening in longitudinal slits. Ovary entirely adnate to the calyx-tube, 1-celled, with 6 to 12 ovules, verticillate round a short central placenta; style filiform, with a small stigma. Fruit a berry, crowned by the calyx-teeth or border, or by a circular scar only. Seeds solitary or rarely 2 or 3; testa somewhat crustaceous; cotyledons very much convolute or variously folded, usually enclosing the radicle. Trees or shrubs glabrous. Leaves coriaceous, with 1 prominent midrib, and pinnate veins often scarcely perceptible or rarely more or less 3-nerved. Flowers usually small, in axillary clusters or cymes, blue or white.

MEMECYLON UMBELLATUM. (Burm.) A middling sized or small tree or large shrub, branches terete, leaves coriaceous deep green and shining, sessile to shortly petioled, very variable in shape, from ovate or cordato-ovate to oblong or elliptic, retuse or obtuse or slightly acute at the apex, penniveined with the veins generally very obscure, very variable in size, up to 6 inches long by 2 inches broad, peduncles axillary or from the old axils below the leaves incrassated at the apex and forming a kind of receptacle, or sometimes wanting with the receptacle sessile, pedicels generally slender and 3-4 lines in length very numerous and each springing from a small sessile scale-like bracteole, flowers bright blue forming dense round balls on the naked stems below the leaves, calyx lined with a disk but without any radiating wing, stamens elongate, style as long as or much longer than the stamens, berry nearly dry or only slightly succulent, greenish, smooth nearly globular 3-4 lines in diameter crowned with the persistent calyx-limb, seed solitary globular, cotyledons fleshy and very much contortuplicate. *Burm. Fl. Ind.* 87. M. ramiflorum, *Lam. Dict.* iv. 88;—*WA. Prod. p.* 319. M. tinctorium, *Wight Illust. tab.* 93. M. sessile, *Benth.*;—*WA. Prod. p.* 320. M. amplexicaule, *WA. Prod. p.* 320 *(but probably not Roxb.)* M. cordatum, *Lam.*

I have specimens of this from all parts of this presidency and from Ceylon, sometimes only as a shrub but on the mountains often a tree of considerable size. The specimen figured is from a good sized tree growing in the Kodinkarnal shola on the Pulnies at 7000 *feet elevation, and the same form occurs on the Nilgiris; it has quite sessile stem-clasping cordate leaves, and the pedicels are sessile on tubercles in the old axils without any peduncles; the more shrubby varieties have generally petioled leaves and peduncled umbels, but amongst these I have forms with sessile cordate leaves and the pedicels without peduncles, so that there is no doubt about the propriety of uniting all the forms; the wood is very hard and close grained, and might answer as a substitute for box. In Ceylon the tree is called Korà-kàhà, and the leaves are used in conjunction with the wood of Morinda citrifolia and Cæsalpinia sappan for producing a permanent red dye.*

Analysis.

1. A flower bud.
2. A flower just before the anthers expand, 2 petals removed.
3. A flower after the fall of the 4 petals, showing the calyx and 8 stamens.
4. A section of a flower, showing the insertion of the stamens and petals on the plane disk lining the calyx tube, and the 1 celled ovary.
5. Cross section of an ovary.
6. An anther highly magnified.
7. Highly magnified view of the insertion of the ovules on the basal placenta. (All drawn from fresh specimens.)

FIG. *A*. MEMECYLON CAPITELLATUM (*the short peduncled variety from Tinnevelly.*)

1. Portion of a branch showing a leaf and its venation, and a peduncle with flower buds.
2. A flower bud.
3. View of the calyx from above, showing the disk with 8 radiating wings.
4. Vertical section of a flower.
5. An anther.
6. Transverse section of an ovary.

[illegible] del. Dunphy Lith.

Memecylon umbellatum. (Burm.)

AXINANDRA ZEYLANICA. (Nat. order Lythrarieæ.)

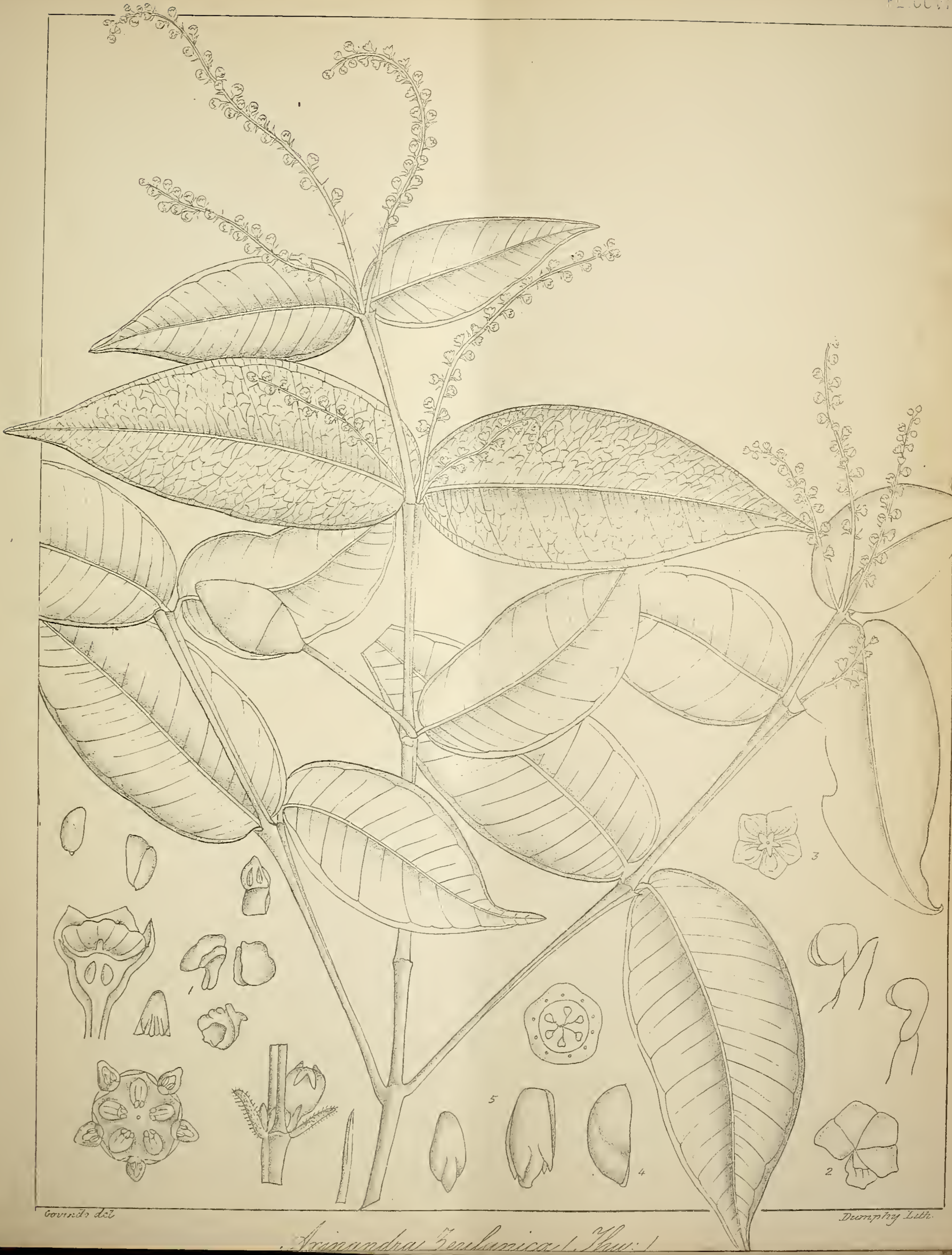
AXINANDRA. *Thw.*—GEN CHAR. Calyx-tube campanulate adnate to the ovary, lobes 5 triangular, petals 5 small inserted into the jaws of the calyx, connate into a deciduous cup, stamens 10 in 2 series dolabriform, 5 inserted with the petals, 5 affixed under the margin of the calyx, filaments short dilated inflexed, anthers adnate affixed at the back, connective thick, much produced behind, quadrate, cells minute, ovary inferior 6-celled, style very short, stigma simple, ovules solitary in the cells erect anatropal, capsule semi-superior woody oblongo-cylindrical surrounded below with the adnate tube of the calyx, loculicidally 2-6 valved at the top, seeds erect oblong compressed, testa membranaceous, the superior margin produced into a wing, the umbilicus basal, cotyledons oblong auriculato-saggitate at the base, radicle short terete. A large tree, very glabrous, branches 4-angled and dilated into wings below the nodes, leaves opposite ovato-lanceolate, acuminate entire coriaceous, racemes axillary suberect, flowers small white very shortly pedicellate.

AXINANDRA ZEYLANICA. (Thw.) A lofty tree, much branched, branches 4 angled, and winged just below the nodes, leaves opposite shortly petiolate, ovato-lanceolate, entire very glabrous and shining, 3-5 inches long by $1\frac{1}{2}$-$2\frac{1}{2}$ broad, penniveined with a prominent intramarginal vein, racemes axillary simple or branched from near the base, flowers small white 2-3 lines long shortly pedicelled, 3 bracteated, bracts linear pubescent equalling the pedicel. *Thw. in Hook. Kew Journ.* vi. 66. *t.* 1. *c.* ;—*Walp. Ann.* iv. *p.* 690.

This large tree has only been found in Ceylon in the Ambagamwa district, elevation 1500 *feet ; nothing is known of its timber, &c. The dissections in the plate were communicated by Dr. Thwaites.*

Analysis.

1. Petals.
2. Corol.
3. Corol, underneath view.
4. A ripe seed.
5. Embryo.



Govindo del. Dumphy Lith.

Axinandra Zeylanica (Thw.)

CASEARIA VARIANS. (Nat. order Samydaceæ.)

CASEARIA. *Jacq.*—GEN. CHAR. Flower-tube short; sepals 4-6, imbricate. Petals wanting. Staminal tube short, emerging from near the base of the flower-tube, divided at its upper margin into 6-15 fertile stamens and as many barren staminodes. Ovary free ovoid 1 celled with 3 or rarely 4 parietal placentas, style simple short; stigmas capitate; ovules numerous, capsule 3-4 valved, valves bearing the seeds in the middle. Seeds oblong, with a fleshy aril; albumen fleshy; embryo straight; cotyledons flat; radicle terete. Trees or shrubs. Leaves distichous, alternate, simple, coriaceous, often marked with linear or circular translucent spots. Stipules minute. Flowers tufted, small.—Valentinia, *Swartz.* Hexanthera, *Endl. Gen.* 917. Ironcana, *Aubl.* Vareca, *Gœrt.* Guidonia, *Griseb.* Pitumba, *Aubl.* Anavinga, *Lam.* Melistaurum, *Forst.* Lindleya, *H. B. et K. and Kunth.* Antigona, *Vell.* Crateria, *Pers.* Chætocrater, *Ruiz et Pav.* Piparea, *Aubl.* Zuelania, *A. Rich.* Thiodia, *Griseb.*

CASEARIA VARIANS. (Thw.) A lofty tree, leaves glabrous coriaceous subopaque reticulated, quite entire or rarely slightly crenate, ovate or ovato-lanceolate to obovate, acuminate or obtuse or rounded at the apex, 2-4 inches long by $1\frac{1}{4}$-$1\frac{3}{4}$ broad, flowers pubescent, stamens 6-8 much longer than the very hairy truncate staminodia, ovary glabrous, placentas 2-3, stigma obscurely 2-3 lobed. *Thw. En. Pl. Zey. p.* 19. C. coriacea, *Thw. l. c. p.* 20. C. Championi, *Thw. l. c. p.* 19.

This tree is very common in all our Western ghat forests and in Ceylon, and it grows to a very large size in the dense moist forests at 2000-3000 *feet elevation. C. coriacea, Thw., is a form with very coriaceous rather larger leaves, but does not otherwise differ; this latter is very common on the higher ranges of the Anamallays,* 6000-7000 *feet elevation, and on the Ceylon mountains at the higher altitudes. I know nothing of the timber or uses of the tree; in drying the leaves turn very black on the upper side. The specimen figured is from the Anamallays.*

Analysis.

1. Apex of a very young branch, shewing the pubescence and the stipules.

2 & 3. Flower buds shewing the 5 imbricate sepals, no petals.

4. Flower open shewing 8 stamens alternating with as many short ciliate scales or staminodes all in a single series and united into a perigynous ring at the base.

5. A portion of the stamen-tube highly magnified.

6. Anthers, front and back view.

7. Ovary with the almost sessile obscurely 3-lobed stigma.

8. Ovary cut transversely, shewing 3 placentas with numerous ovules attached to each. (All drawn from fresh specimens.)

FIG. *A.* View of the fruit at dehiscence (of another species) to illustrate the genus.

Govindo, del.   Dumphy Lith.

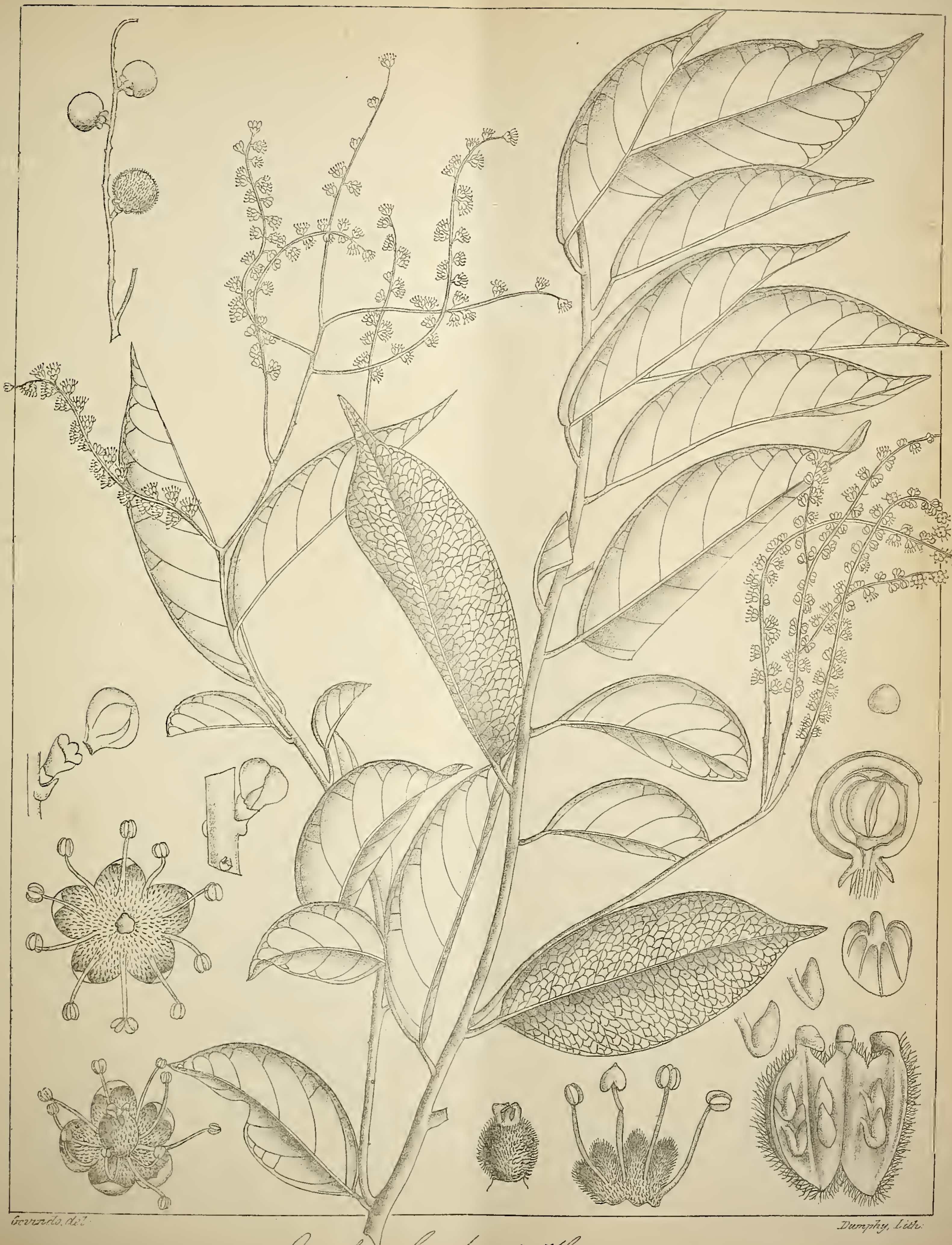
Casearia varians. (Thw:)

OSMELIA GARDNERI. (Nat. order Samydaceæ.)

OSMELIA. *Thw.*—GEN. CHAR. Calyx-tube very short, lobes 4-5 imbricate, petals none, stamens 8-10, 5 alternate with as many deeply 2-lobed densely villous staminodes, 5 inserted into the sinuses of the staminodes, filaments elongate subequal, styles 3 short incurved, stig mas capitellate, ovules few, placentas 3 parietal, capsule subglobose subcoriaceous 3-valved few seeded, seed subglobose, aril fleshy red, testa membranceous, cotyledons orbicular foliaceous, radicle short. Trees, leaves alternate, petiolate, ovato or oblongo-lanceolate, not dotted, stipules minute deciduous, flowers small furnished with a small involucel, in terminal racemose panicles.—Stachycrater, *Turcz in Bull. Mosc.* 1858. 464.

OSMELIA GARDNERI. (Thw.) A middling sized tree with a smooth bark, branches terete, young ones pilose, leaves ovato-lanceolate acuminate glabrous penniveined, 2½-4 inches long by 1-1½ inches broad, petiole sulcate above 2-3 lines long, stipules minute deciduous, racemes terminal paniculate (from the abortion of the leaves) many flowered pubescent, flowers small white more or less tinted with red, very shortly pedicellate, involucel small cup shaped; calyx lobes rounded externally pilose, ovary oblong densely pilose, placentas 2-3 ovuled, capsule 1-4 seeded. *Thw. En. Pl. Zey. p.* 20. Casearia paniculata, *Gardn. MSS.*

This tree has only been observed in Ceylon in the central provinces at about 3000 *feet elevation; it is not common; nothing is known of its timber or uses. Two other species of the genus inhabit the Philippines. The dissections in the plate were communicated by Dr. Thwaites.*



Govindo, del.

Dumphy, Lith.

Osmelia Gardneri (Thw.)

HOMALIUM CEYLANICUM. (Nat. ord. Samydaceæ.)

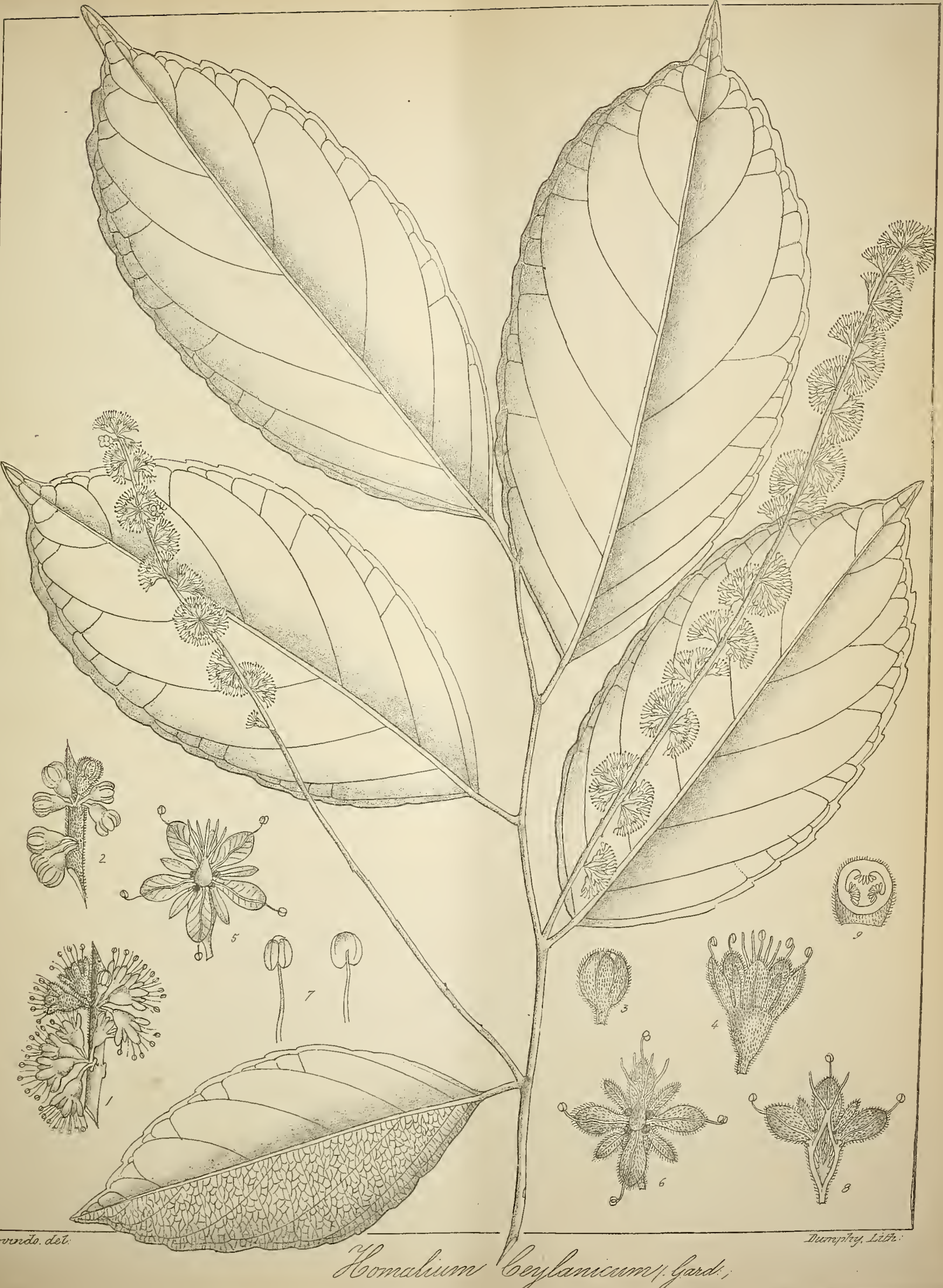
HOMALIUM. *Jacq*—GEN. CHAR. Flowers dichlamydeous, hermaphrodite. Flower-tube turbinate adnate to the base of the ovary. Sepals 4-12 persistent. Petals as many as calyx lobes emerging from the throat of the calyx, linear-oblong, flat, persistent. Stamens equal in number to the petals and opposite to them, or in greater numbers arranged in fascicles opposite to them, alternating with as many glands; filaments thread-like; anthers small, didymous. Ovary partly adherent 1-celled; styles 2-5, thread-like; stigmas simple or capitellate. Ovules numerous or few, attached to 2-5 parietal placentas. Capsule partly adherent, coriaceous, 2-5 valved, few-seeded. Seeds angular or oblong; testa crustaceous; albumen fleshy, cotyledons leafy. Trees or shrubs. Leaves alternate, stalked, ovate or lanceolate, glandulose, crenate or serrate. Stipules small. Flowers small in slender axillary branched panicles. *Jacq. Stirp. Amer.* 170, *t.* 183. *f.* 72. Blackwellia, *Juss.* Astranthus, *Lour.* Racoubea, *Aubl.* Napimoga, *Aubl.* Cordylanthus, *Blume.* Nisa, *Norohn.* Myriantheia, *Thou.*

HOMALIUM CEYLANICUM. (Gardn.) A large tree 40-50 feet high, leaves ovate to elliptic or rarely obovate, with a rather sudden blunt acumination coarsely crenated, membranaceous to subcoriaceous, glabrous and shining above, glabrous beneath or slightly puberulous on the costa and veins, 3-6 inches long by $1\frac{1}{2}$-$2\frac{3}{4}$ broad, petioles 3-6 lines long, racemes axillary generally much longer than the leaves, erect or pendulous, puberulous, flowers densely hairy small glomerate 3-5 together pedicellate, sepals 4-6 linear oblong, petals 4-6 broader than the sepals about equal to them in length or a little longer, stamens equal in number to the petals and opposite them, glands as in the generic character, styles and placentas 3-5.—Blackwellia Ceylanica, *Gardn. Calc. Journ. of Nat. Hist. vol.* vii. *p.* 452. B. tetrandra, *Wight Icones. tab.* 1851.

This fine timber tree is not uncommon throughout our western forests up to 4000 *feet, and I have also found it on the North Arcot hills near Madras, and it inhabits Ceylon, where it is called Leeyang. The timber is very strong and in use for building and various other purposes; the petals and calyx segments are quite similar in texture and appearance, though they differ somewhat in size, and the flowers are sometimes described as having a* 8-12 *parted perianth.*

Analysis.

1-2. Magnified portions of a raceme.
3. A flower bud.
4. A flower, side view.
5. A 5-merous flower open, shewing 5 petals with 1 stamen opposite each, and the alternate glands opposite the calyx-segments, and 5 styles.
6. A 4-merous flower with 4 styles.
7. Anthers, front and back view.
8. A flower cut vertically, showing the placentas and ovaries.
9. Transverse section of an ovary with only 3 styles, shewing 3 parietal placentas. (All drawn from fresh specimens.)



Govindo. del. Dunphy, Lith.

Homalium Ceylanicum (Gard.)

HOMALIUM TRAVANCORICUM. (Nat. order Samydaceæ.)

For Gen. Char. see letter press to Plate ccx.

HOMALIUM TRAVANCORICUM. (Bedd.) A middling sized tree, leaves oval to ovate quite rounded at the apex or attenuated into a blunt point, crenate, membranaceous or subcoriaceous, glabrous on both sides, 2-3 inches long by 1-2 broad, petioles 3-5 lines long, racemes axillary puberulous about the length of the leaves, flowers densely hairy small not so crowded as in H. Ceylanicum, subsessile, generally 5-merous, petals 2-3 times as large as the sepals, stamens in fascicles of 3-4 opposite each petal (hence 15-20 in the pentamerous flowers), glands, styles, &c., as in the generic character.

This very handsome middling sized tree I have only detected on the South Travancore and Tinnevelly ghats ; it belongs to the section Racoubea of the Genera Plantarum, and the genus Cordylanthus, Blume, differing from our other species in its numerous stamens. Nothing is known of its timber.

Analysis.

1. Magnified portion of a raceme.
2. A flower bud.
3. A flower, side view.
4. A 5-merous flower showing 4 stamens opposite each petal and 3 styles.
5. Vertical section of a 5-merous flower, showing the ovaries and only 3 stamens to each petal.
6. Anthers, front and back view.
7. A 3-styled ovary cut transversely, showing the 3 placentas. (Drawn from flowers in spirit.)

Covinda del

Dumphy Lith:

Homalium Travancoricum (Bedd.)

TETRAMELES NUDIFLORA. (Nat. order Datisceæ.)

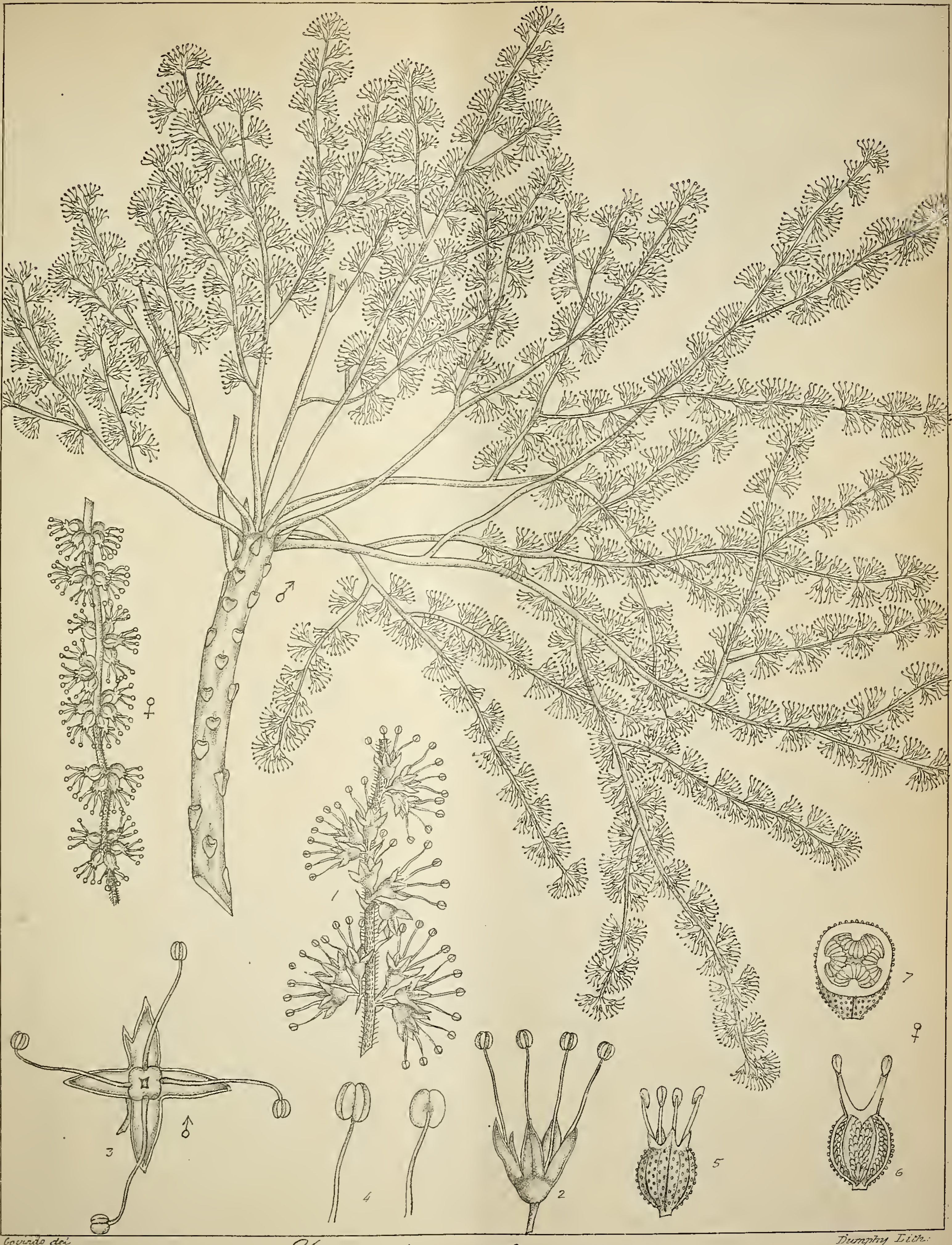
TETRAMELES. *R. Brown.*—GEN. CHAR. Flowers diæcious ; *male flower,* calyx-tube very short, lobes 4 ovate or oblong equal or unequal, petals 0, stamens 4 placed round the depressed disk, filaments elongate, anthers short didymous, cells dehiscing introrsely, rudiment of the ovary 0 or 4 angled. *Female flower,* calyx-tube slightly 4-angled, teeth 4 short, petals 0, staminodia 0, styles 4, subulate short, stigmas rather dilated truncate and papillose on the inside, ovules inserted in several series on the 4 parietal placentas, capsule membranaceous subglobose 4-sulcate dehiscing at the apex between the styles. An immense tree, leaves deciduous long petioled ovato or cordato-rotundate acuminate unequally toothed or subentire, beneath tomentose or slightly hirsute, flowers small the male in many flowered panicles, the female in long racemes from the ends of the branches, when the tree is quite destitute of leaves.—Anictoclea, *Nimmo in Grah. Cat. Bomb. pl.* 252.

TETRAMELES NUDIFLORA. (R. Br.) A tree of most gigantic growth, and often furnished with very large buttresses, leaves long petioled cordate acuminate serrated, flowers small, male very crowded in panicles from the ends of the branches, female in pendulous racemes.—Tetrameles Grahamiana, *Wight's Icones. tab.* 1956. Anictoclea Grahamiana, *Nimmo.*

This is one of the largest trees in the presidency, not uncomm on throughout the western forests of the peninsula from Bombay down to Cape Comorin, and also in Ceylon ; it is very abundant about the foot of the Nilgiris on the western side, and in the dense forests in the plains of South Canara, and is called Bolur in Canarese ; it sheds its leaves early in January and flowers when quite leafless in February. The timber is said to be soft and worthless. I have not been able to represent the leaves in the plate, as I do not possess any.

Analysis.

1. Portion of a panicle of male flowers magnified.
2. A male flower much magnified.
3. The same open.
4. Anthers.
5. A female flower.
6. Vertical section of the same, shewing the ovules.
7. Transverse section of the ovary, shewing the 4 parietal placentas. (All drawn from fresh specimens.)



Govindo del.

Dumphy Lith.

Tetrameles nudiflora. (R: Br:)

POLYSCIAS ACUMINATA. (Nat. order Araliaceæ.)

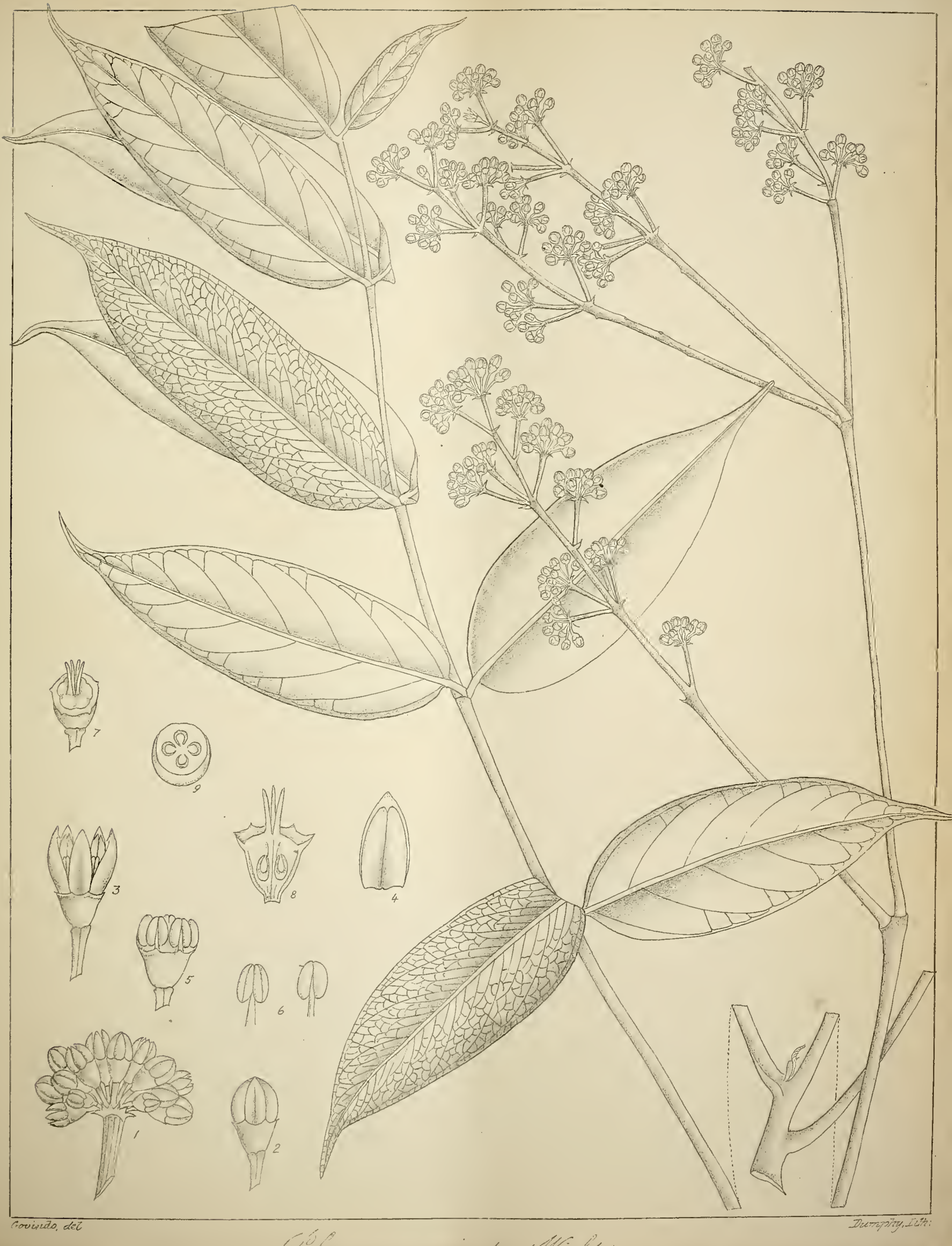
POLYSCIAS. *Forst.*—GEN. CHAR. Margin of the calyx truncate or repando-dentate, petals 4-8 valvate free or cohering at the apex, stamens as many as the petals, filaments short, anthers ovate or oblong straight or recurved, disk plane or rarely subconical; ovary 4-8 celled, styles distinct or rarely connate in a cone at the base, at length recurvo-patent introrsely stigmatose above. Fruit subglobose, ribbed when dry, exocarp fleshy; pyrenes coriaceous or crustaceous, seeds compressed, albumen not ruminate. Trees or shrubs, glabrous, leaves pinnate, stipules rather conspicuous or none, flowers in umbels, heads or racemes, bracts scale-like or none, pedicels articulated below the flower. *Forst. Char. Gen.* 63. *t.* 32. Botryopanax, *Miq.* Gastonia, *Rœp.* (*not Comm.*) Grotefendia, *Seem. Jour. Bot.* ii. Eupteron, *Miq. Fl. Ind. Bat.* Hedera, *Wight Ic. t.* 1062.

POLYSCIAS ACUMINATA. (Wight.) A glabrous tree, leaves equally or unequally pinnate, leaflets 5-7 pair with or without an odd one, leaflets ovato-oblong to oblong with a long fine acumination, 3-4 inches long by about $1\frac{1}{4}$ inches broad, petioles about 2 lines long, racemes ample panicled, umbels with a subulate bract at the base many flowered, pedicels with a subulate bracteole at the base of each, articulated just below the flower, flowers 4-5 merous, petals expanding, styles distinct, fruit subglobose size of a small pea.—Hedera acuminata, *Wight. Ic. tab.* 1062. Hedera parasitica, *Don. Prod. Fl. Nep. p.* 188.

This tree is common on the Nilgiris west side at 4500-5000 *feet elevation, on the Annamallays and Tinnevelly ghats at high elevations, and on the Ceylon mountains. I have never seen it parasitic. I know nothing of its timber or uses, but the former could not be of any value I think. In about a dozen flowers dissected I always found only* 4 *styles and* 4 *cells to the ovary, the number of the petals being sometimes* 4 *and sometimes* 5*; the number probably differs, but as the* 4*-petaled flowers had* 4 *styles, I should have expected* 5 *in the* 5*-petaled flowers.*

Analysis.

1. Au umbel of flowers.
2. A flower bud.
3. A full flower, showing the articulation at the petiole.
4. A petal.
5. A 5-petaled flower, petals removed.
6. Anthers, front and back view.
7. A 5-petaled flower, petals and stamens removed, showing the disk and 4 styles.
8. Ovary cut vertically, showing the pendulous ovules.
9. Ovary cut transversely, showing 4 cells. (All drawn from fresh specimens.)



Govindo, del

Dunphy, Lith:

Polyscias acuminata; (Wight)

HEPTAPLEURUM RACEMOSUM. (Nat. order Araliaceæ.)

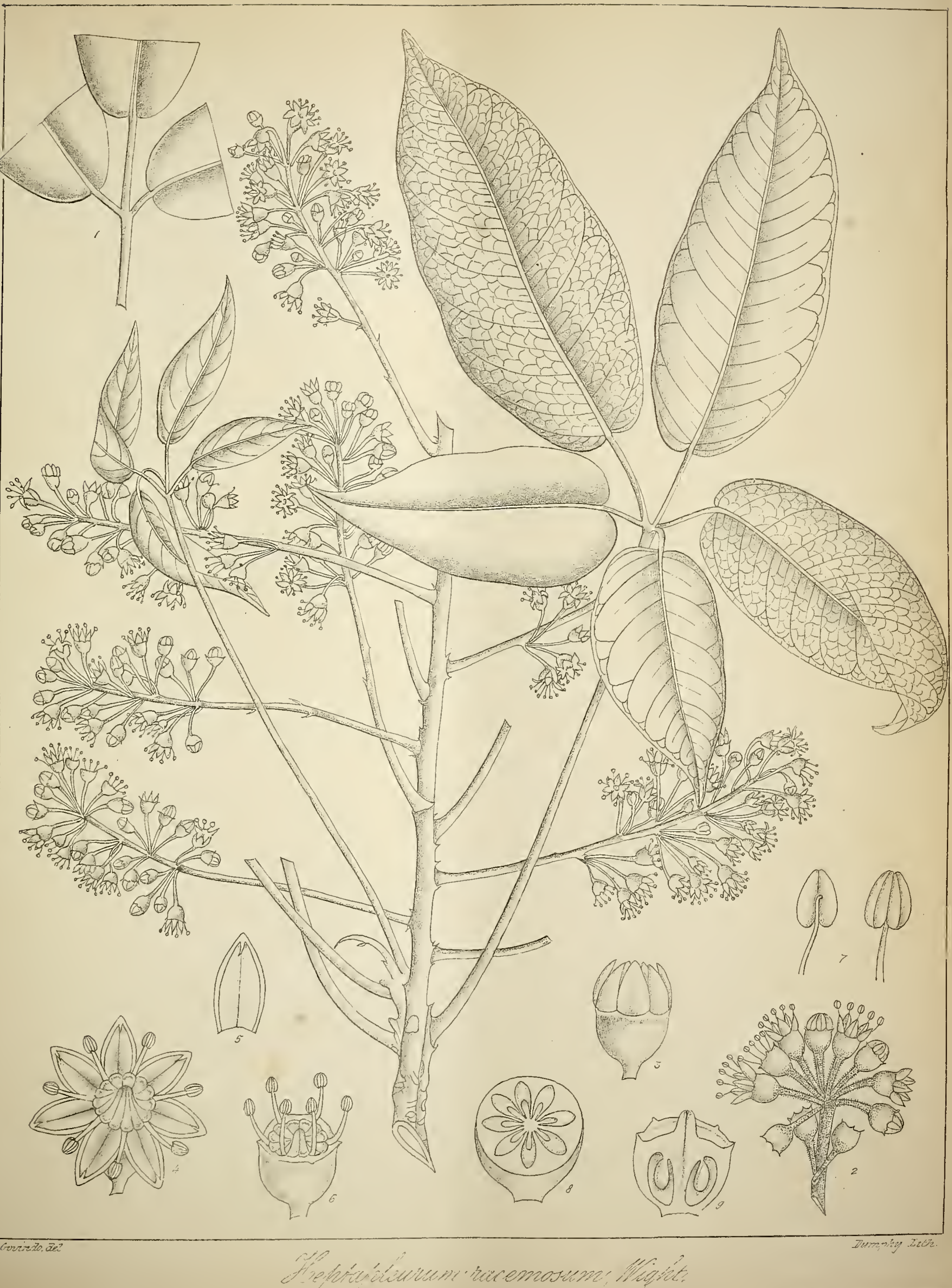
HEPTAPLEURUM. *Gærtn.*—GEN. CHAR. Flowers occasionally polygamous, calyx teeth minute or inconspicuous, petals 5-9 valvate, stamens as many as the petals, anthers ovate, disk convex or conical or in male flowers concave, ovary with as many cells as there are petals, styles united to a short cone or almost obsolete, stigmas scarcely prominent, fruit nearly globular, the endocarp not very hard forming 5-9 one seeded pyrenes. Trees or tall shrubs, sometimes epiphytic and scandent or subscandent, leaves alternate digitately compound or trifoliate or rarely 1-foliate, leaflets entire or toothed, flowers small very numerous generally in umbels rarely only fascicled in terminal or axillary panicles or racemes.—Paratropia, *DC. Prod.* iv. 265. Sciadophyllum, *Blume. Bijdr.* 875. (*not P. Br.*) Hedera, *WA. and Wight. exparte* (*not Linn.*)

HEPTAPLEURUM RACEMOSUM. (Wight.) A large tree, the young parts furnished with fugacious ferrugineous tomentum or glabrous, leaves digitate, leaflets 3-7 (generally 5-7) oblongo-lanceolate acuminate to elliptic cuspidate, more or less undulate on the margin, 4-7 inches long by $1\frac{1}{2}$-2 inches broad, panicles terminal and lateral often much elongate and branched, the branches slightly aculeate and all generally furfuraceous at least whilst young, pedicels fasciculato-racemose (not umbelled) 4-6 lines long, flowers 5-8 merous, styles very short united into a short cone, stigmas obtuse.—Hedera racemosa, *Wight Icones. tab.* 1015.

This fine tree is common on the Nilgiris and Anamallays, &c. at elevations from 3000 *to* 7000 *feet, and also in Ceylon. I know nothing of its timber or uses. The drawing was by a mistake taken from a specimen collected in Ceylon, but it does not differ from the South Indian tree except in being more puberulous and in the parts of the flower being generally more numerous.*

Analysis.

1. Portion of a leaf shewing only 3 leaflets.
2. Magnified portion of a raceme shewing the ferrugineous tomentum.
3. A flower bud.
4. A 7-merous flower open.
5. A petal removed.
6. A 6-merous flower petals removed, shewing the disk and very short styles united into a cone, and the stamens.
7. Anthers, front and back view.
8. An eight-celled ovary cut transversely.
9. Vertical section of an ovary shewing the pendulous ovules. (Drawn from dried flowers.)



Govindo, Del. Dumphy Lith.

Heptapleurum racemosum, Wight.

ALANGIUM LAMARCKII. (Nat. order Cornaceæ.)

ALANGIUM. *Lam.*—GEN. CHAR. Flowers hermathrodite, calyx-tube turbinate often sulcate, limb 5-10 toothed or truncate, petals 5-10 strap-shaped at length reflexed or revolute, valvate, stamens equalling in number or 2 or 4 times as many as the petals, filaments filiform or flat more or less villous, anthers linear elongate, cells narrow adnate to the connective dehiscing along the sides, disk cushion-shaped depressed in the centre lobed or crenulate, ovary 1-celled, style narrow clavate or filiform, stigma clavate or capitate 4-many-fid or many lobulate lobes conduplicate, ovule 1 pendulous from the apex of the cell, berry crowned with the limb of the calyx, seed oblong, testa thin, albumen ruminate easily crumbled, cotyledons foliaceous contortuplicate, radicle elongate cylindric thick. Trees or shrubs unarmed or spinescent, leaves alternate petiolate entire, flowers rather large fascicled in the axils.

ALANGIUM LAMARCKII. (Thw.) Varying in size from a large shrub to a considerable tree, branches often spinescent, leaves from linear-oblong to ovato-lanceolate obtuse at the apex or acute or acuminate, often velvetty beneath, 4-6 inches long by 10 lines to 2 inches broad, petioles about ½ inch long, petals 6-10, stamens twice as many as the petals, filaments hairy at the base, flowers whitish or purple fragrant solitary or aggregated in the axils of the leaves, drupe tomentose with a purplish rind filled with red pulp. *Thw. En. Pl. Zey. p.* 133. A. decapetalum, *Lam.* A. hexapetalum, *Lam.* A. tomentosum, *Lam.*

This is generally only a large shrub or small tree in the plains; but it grows to a considerable tree on our mountains, it is very common throughout the Peninsula and in Bengal, it is very abundant in some of the Locomotive Fuel Reserves in this Presidency, and is an excellent plant for this purpose as it yields a first class fuel, and grows most admirably from coppice. The tree is called Akola in Hindustanee, Udugu in Teligu, Alangi in Tamil (hence its botanical name), Ankola in Canarese and Eepaata in Ceylon. The wood is strong, very close and even grained, of a dark brown color, easily worked, and gives a smooth glossy surface and is capable of sustaining a great weight. A cubic foot unseasoned weighs 55-60 lbs. and 49 lbs. when seasoned, and its specific gravity is ·784, and it is well suited for ornamental work. In Gumsur a sort of wooden bell attached to the neck of cattle is made of this wood, which is said to be peculiarly adapted for producing sound. The sap-wood is white, close and even grained, and nearly as strong as the heart; the fruit is eaten but is not agreeable, the root and leaves are used medicinally.

Analysis.

1. A flower bud.
2. An open flower showing 8 reflexed strap-shaped petals (they vary from 6 to 10) and 16 stamens.
3. A flower, petals and stamens nearly all removed, shewing the calyx (7-toothed in this instance), the disk, style and stigma.
4. An anther highly magnified, shewing the filament very hairy at the base and the narrow adnate cells.
5. A flower cut vertically, shewing the insertion of the petals and stamens and the 1-celled ovary with the solitary pendulous ovule.
(All drawn from fresh specimens.)

Govindo Del.

Dunning Lith

Alangium Lamarckii, (Thw.)

MASTIXIA ARBOREA. (Nat. order Cornaceæ.)

MASTIXIA. *Bl.*—Flowers hermathrodite. Calyx-tube campanulate, limb dilated 4-5 toothed, petals 4-5 ovate coriaceous valvate, apex inflexed fimbriate or toothed, stamens 4-5 alternate with the petals and inserted under the margin of the disk, filaments short compressed, anthers cordate, disk large fleshy, ovary inferior 1 celled. Style short thick, stigma punctiform, ovule 1 pendulous from the apex or near the apex of the cell. Drupe ovoid subglobose or oblong, umbilicate at the apex, sarcocarp fleshy green, putamen woody very hard deeply channelled on one side and there furnished with a hard woody process which intrudes into the albumen and nearly divides the cell into 2 compartments, seed conforming to the cell, testa membranaceous, albumen copious fleshy, embryo with thin membranaceous ovate foliaceous cotyledons and a very long superior cylindrical radicle. Trees, glabrous, branches terete, leaves simple entire oblong (turning black in drying, at least on the upper side) alternate in the Indian species, opposite in some Java ones; flowers inconspicuous in terminal many flowered panicles. *Bl. Bijd.* 654;—*Mus. Bot. Lugd. Bat.* i. 256. *t.* 58. Bursinopetalum, *Wight Icones tab.* 956.

MASTIXIA ARBOREA. (Wight.) **A very large tree, leaves very dark green glabrous coriaceous oblong obtuse or acute or with a sudden rather long acumination, 2-9 inches long by $1\frac{1}{2}$-4 inches broad, petiole $\frac{1}{2}$-2 inches long, flowers tetramerous or pentamerous, calyx and corol slightly pubescent, fruit oblong size of a large olive the apex marked with a large scar where the flower has separated.—Bursinopetalum arboreum,** *Wight Icones tab.* 956. B. tetrandrum, *Wight MSS.*;—*Thw. En. Pl. Zey. p.* 42.

This tree is very abundant in our dense Western ghat moist forests from Canara downwards to Cape Comorin, at elevations from 2000 *to* 7000 *feet, and it is also found in Ceylon; it is most abundant in the Bolamputty forests at* 2500 *feet elevation, and is common on the Nilgiris at* 6000-7000 *feet, at the higher elevation it is not nearly such a large tree but its leaves are much larger and more coriaceous and its flowers are larger. The tetramerous form is certainly not a distinct species, as both forms occur on one and the same tree. Nothing is known of its timber or uses, but the former is probably good.*

Analysis.

1. A flower bud.
2. A full flower, side view.
3. The same front view, showing the large disk and the stamens.
4. A petal.
5. A flower cut vertically, showing the insertion of the stamens below the disk, and the ovule pendulous from the apex of the cell.
6. Anthers, front and back view.
7. Diagram of the parts of the flower.
8. Very young fruit cut vertically.
9. Ripe fruit.
10. The same, part of the fleshy sarcocarp removed to show the hard bony putamen.
11. Fruit or drupe cut transversely showing the copious fleshy albumen into one side of which the hard woody process from the putamen is seen intruding and nearly dividing it into 2.
12. Embryo showing the long cylindric radicle and leafy cotyledons. (All drawn from fresh specimens.)

[illegible] Del. Dumphy Lith.

Mastixia arborea (Wight)

VIBURNUM PUNCTATUM. (Nat. order Caprifoliaceæ.)

VIBURNUM. *Linn.*—GEN. CHAR. Calyx with a border of 5 small teeth, corol rotate or shortly tubular regular. Stamens 5, ovary 1-celled or very rarely 2-3 celled with 1 pendulous ovule in each. Stigmas 3 or rarely 2 sessile, berry 1-seedod. Small trees or erect shrubs, leaves entire or palmately lobed, flowers in terminal cymes or panicles,

VIBURNUM PUNCTATUM. (Ham.) A middling sized or small tree, young branches, petioles, and peduncles dotted with small rusty-colored scales, leaves coriaceous elliptic or elliptico-lanceolate acuminate, quite entire, the margin slightly recurved, glabrous, above shining, beneath covered with minute rusty-colored dots or in age only puncteolate, 4-4½ inches long by 1½-2 broad, petioles about ½ inch long, corymbs terminal large trichotomous, subumbellate, the branches angled, calyx scale-dotted, corol rotate or scarcely campanulate dotted with scales, berry oval-oblong ⅓ inch long compressed, endocarp bi-sulcate on both sides. *Ham. in Don. Prod.* 142. V. acuminatum, *Wall.*;—*WA. Prod. p.* 386.

This small tree is very common in many of our subalpine and alpine jungles from no great elevation up to 6000 *feet; it is also found on the Himalayas and in Java.*

Analysis.

1. Under surface of a leaf, showing the dot like scales.
2. A flower bud.
3. A full flower, showing calyx and corol dotted with scales.
4. Corol removed and opened out, showing the 5 stamens.
5. The ovary and the 3 sessile stigmas.
6. Anthers, front and back view.
7. Ovary cut vertically, showing its single cell and solitary pendulous ovule.
8. Bunch of fruit. (Drawn from fresh specimens.)

Govindo. del

Dumphy Lith:

Viburnum punctatum (Ham.)

HERITIERA PAPILIO. (Nat. order Sterculiaceæ.)

HERITIERA. *Ait.*—GEN. CHAR. Monæcious, calyx 4-6 toothed or cleft, petals 0. *Male*: staminal column slender bearing 4-6, 2-celled anthers in a ring just below the apex of the column regularly arranged in a single series, cells parallel. *Female*: ovaries 56 distinct but connivent, ovulss 12 from the ventral suture near the base or at or above the middle, when 2 collateral or superposed, style short recurved a pair of very minute staminodes on a single filament between each ovary at the base, or staminodes absent, ripe carpels woody or fibrous 1 seeded indehiscent keeled along the back or extending into a long membranaceous and fibrous wing. Seed exalbuminous, cotyledons thick, radicle next the hilum.

Trees with entire simple leaves, silvery lepidote underneath, venation penniveined or sub-3-nerved at the base, flowers small in axillary dichotomous panicles.—Bolanopteris, *Gœrtn. Fruct.* ii. 94. *t.* 98-99.

HERITIERA PAPILIO. (Bedd.) A very lofty evergreen tree, monæcious, all the young parts, panicles, and inflorescence clothed with a golden soft stellate tomentum, trunk erect of great height, leaves 3 nerved at the base, veins pinnate above. lanceolate rather acute at the apex, 4-5 inches long by $1\frac{1}{4}$-2 broad, when young densely covered on the upper side with fugacious close set scales, at length quite glabrous and shining above, beneath permanently silvery with close set scales (as in Cullenia), petioles 8-10 lines long, panicles axillary much shorter than the leaves, compound branches di-trichotomous densely covered with scaly tomentum as is the calyx, flowers cream-colored, bractes small and very early caducous, calyx campanulate, in the male flower 4-5 cleft to nearly the middle about 2 lines long, staminal column slender glabrous, anthers 4-5, in the female, calyx 5-6 cleft, ovaries 5-6 distinct sparingly covered when young with stellate scales soon quite glabrous, 2-ovuled, a pair of minute sterile stamens on a single filament not $\frac{1}{2}$ a line long are present between the base of each ovary, styles recurved, carpels 1 seeded, samaroid produced into a large sub-deltoid membranaceous wing shaped like the outer wing of some butterflies, very fibrous with numerous nerves, the lamina soon separating and exposing the fibres.

An immense tree common in the dense moist forests above Courtallum (Tinnevelly) at about 3000 *feet elevation, also about Peermede (Travancore)* 3500 *feet, in flower in August and September, it has only recently been discovered, and should be added to the Manual at page* xxxiii ; *it yields a very valuable tough timber.*

Analysis.

1-2. Pentamerous female flowers.
3. The same open, showing the 5 ovaries with a pair of minute staminodes between each at the base.
4. Staminodes.
5. An ovary.
6. The same cut vertically, showing 2 superposed ovules.
7-8-9. Young fruit.
10. 5-merous male flowers.
11. The same opened, showing the column of stamens.
12. A 4-merous male flower, the st. column with 4 anthers.
13. A column of stamens from a 5-merous flower, showing 5 anthers.
14-15. Anthers.
16. Ripe fruit (life size.)
17. A portion of the wing, showing the lamina separating and exposing the fibres. (Drawn from fresh specimens.)

Govindo del.

Heritiera Papilio. (Bedd:)

HYMENODYCTION OBOVATUM. (Nat. order Rubiaceæ.)

HYMENODYCTION. *Wall.*—GEN CHAR. Calyx tube ovate, border 5-toothed, corol-tube infundibuliform short or elongate the limb 5 lobed, lobes valvate in the bud, anthers exserted or included, the filaments inserted on to the corol near its base quite free or monadelphous in a tube at the base, style filiform much exserted, stigma clavate capitate, ovary 2-celled, ovules numerous attached to a large fleshy placenta which is aduate along the whole length of the axis but is easily separable and at length becomes free, capsule 2-celled 2-valved loculicidal, seeds flat imbricate surrounded by a reticulated wing which is bifid at the base, embryo thick in fleshy albumen, cotyledons cordate, radicle oval. Trees, leaves entire long petioled, stipules large glandularly serrate, panicles terminal furnished with 1 or more large white or cream colored floral leaves, flowers small fragrant. *Wall. in Roxb. Fl. Ind. ed. Cary. vol.* ii. *p.* 148. Cinchona, *Roxb. Fl. Ind.* 1. *p.* 529.

HYMENODYCTION OBOVATUM. (Wall.) A large tree, leaves crowded at the apex of the branches generally obovate with a narrow sudden acumination, some of the upper ones oblong or ovate, glabrous on both sides except the axils of the nerves beneath, about 4 inches long by $2\frac{1}{4}$-$2\frac{1}{2}$ broad, pinnate veins rather prominent, veinlets beautifully reticulated beneath, petioles $1\frac{1}{2}$ to 2 inches long, stipules ovate or oblong gland-serrated deciduous, racemes terminal erect pubescent several together generally simple, rarely with 1 or 2 branches, each generally furnished with only one floral leaf just below the flowers which is lanceolate convex and a little rugose above, pure white or cream colored beautifully veined and reticulated and slightly pubescent underneath, about 2 inches long, and on a shining petiole of the same length, sometimes this floral leaf is absent on one or more of the racemes, flowers small sessile or subsessile furnished with linear subulate bracts at their base, calyx very hairy: corol slightly hoary, tube short, limb subcampanulate with the lobes lanceolate acute, stamens monadelphous in a tube which is adnate to the base of the corol but easily separable, ovary hairy. *Wall. l. c. p.* 153.

This beautiful tree is not uncommon in our subalpine forests from Canara down to South Travancore, up to elevations of 4000 *feet, it is less common however than the H. utile of Wight (which I take to be H. thyrsiflorum, Roxb.); it is also found in the Bombay Presidency, where it is called Karwai, (i. e., bitterness), in Tamil it is called Yella mala kai, its timber is used by the natives for a variety of purposes and is probably equal to that of H. excelsum, in the Madura district the tree is called Mallay Tanák.*

Analysis.

1. A stipule, showing the the black glands round the edge.
2. A flower.
3. Corol opened out, showing the stamens joined in a ring at the base which is adnate to the corol tube.

4-5. Anther, front and back view.

6. Ovary cut vertically.
7. Ovary cut transversely.
8. Branch of fruit.
9. A seed.
10. The bracteoles at the base of the flowers.
11. A portion of a raceme. (All but 8 and 9 from fresh specimens.)

Fig. *A*. Analysis of H. utile, *Wight*, showing that the stamens are free. (Drawn from fresh specimens.)

Dumphy . lith

Hymenodyction obovatum, Wall.

MORINDA CITRIFOLIA. (Nat. order Rubiaceæ.)

MORINDA. *Linn.*—GEN. CHAR. Flowers usually several together, united at the base into a small head. Calyx limb short, scarcely toothed. Corolla tube cylindrical or slightly dilated at the top; lobes 5, rarely 4, valvate in the bud. Anthers included in the tube or rarely exserted. Ovary 2 celled or more or less completely 4-celled, with 1 ovule in each cell, laterally attached at the base or below the middle; style exserted, with 2 stigmatic lobes or rarely entire. Fruit of each flower-head united in a compound succulent berry, including a number of hard 1-seeded pyrenes, usually 2 to 4, proceeding from each flower. Shrubs or small trees, or sometimes woody climbers. Stipules usually membranous and united within the petioles in a short sheath. Flower heads on axillary or terminal solitary or clustered peduncles.

MORINDA CITRIFOLIA. (Linn.) A small tree glabrous, branchlets more or less 4 angled, leaves glabrous or slightly pubescent or only hairy in the axils underneath, from broad ovate to narrow lanceolate, acuminated at the apex generally about 4-5 inches long by 1¼ to 2¼ broad but sometimes larger, petioles 3-6 lines long, stipules membranaceous, broad entire or bifid, variable in size, peduncles apparently leaf opposed from the abortion of the subtending leaf varying from ¾ to 2 inches in length glabrous or slightly pubescent, capituli many flowered without any bracteoles, the calyx-tubes quite connate in the flower head, corol 5-8 lines long more or less hairy white fragrant, ovary 2 celled but the thick fleshy placentas are so extended as to make it nearly 4 celled, ovules 4 erect from near the base, fruit forming a pulpy mass 1-1¼ inches in diameter, the pyrenes orbicular flattened about 3 lines in diameter. *Linn.*;—*DC.* iv. 446;—*Roxb. Fl. Ind.* i. 541. M. tinctoria, *Roxb. l. c. p.* 543.

This small tree is rather common throughout the presidency. The specimen figured is from the Anamallay forests and is a variety with very broad abruptly pointed leaves, a narrower leaved gradually pointed variety is very common about the banks of the Cauvery and other localities; a careful dissection of the flowers of these 2 forms shows no difference. The tree is called 'Al in Hindustani, Togare, Togaree mogilli, Mulugu, and Maddi in Teligu, Noonah in Tamil. The roots yield a valuable red dye which is fixed with alum; the red thread used in carpet making and red turbans are generally dyed with it. The tree is cultivated in some parts of India and Birmah solely for its dye, the roots selling at 4 *to* 5 *Rs. the maund. The wood is close grained, light, tough and easily worked, when fresh of a bright yellow color, but after exposure turning to yellowish brown; a cubic foot unseasoned weighs nearly* 40 *lbs. and* 30 *lbs. when seasoned, and its specific gravity is* ·480; *it is used for gun stocks, wooden shoes, and a variety of other purposes.*

Govindo, del. Dumphy Lith:

Morinda citrifolia (Linn:)

CANTHIUM DIDYMUM. (Nat. ord. Rubiaceæ.)

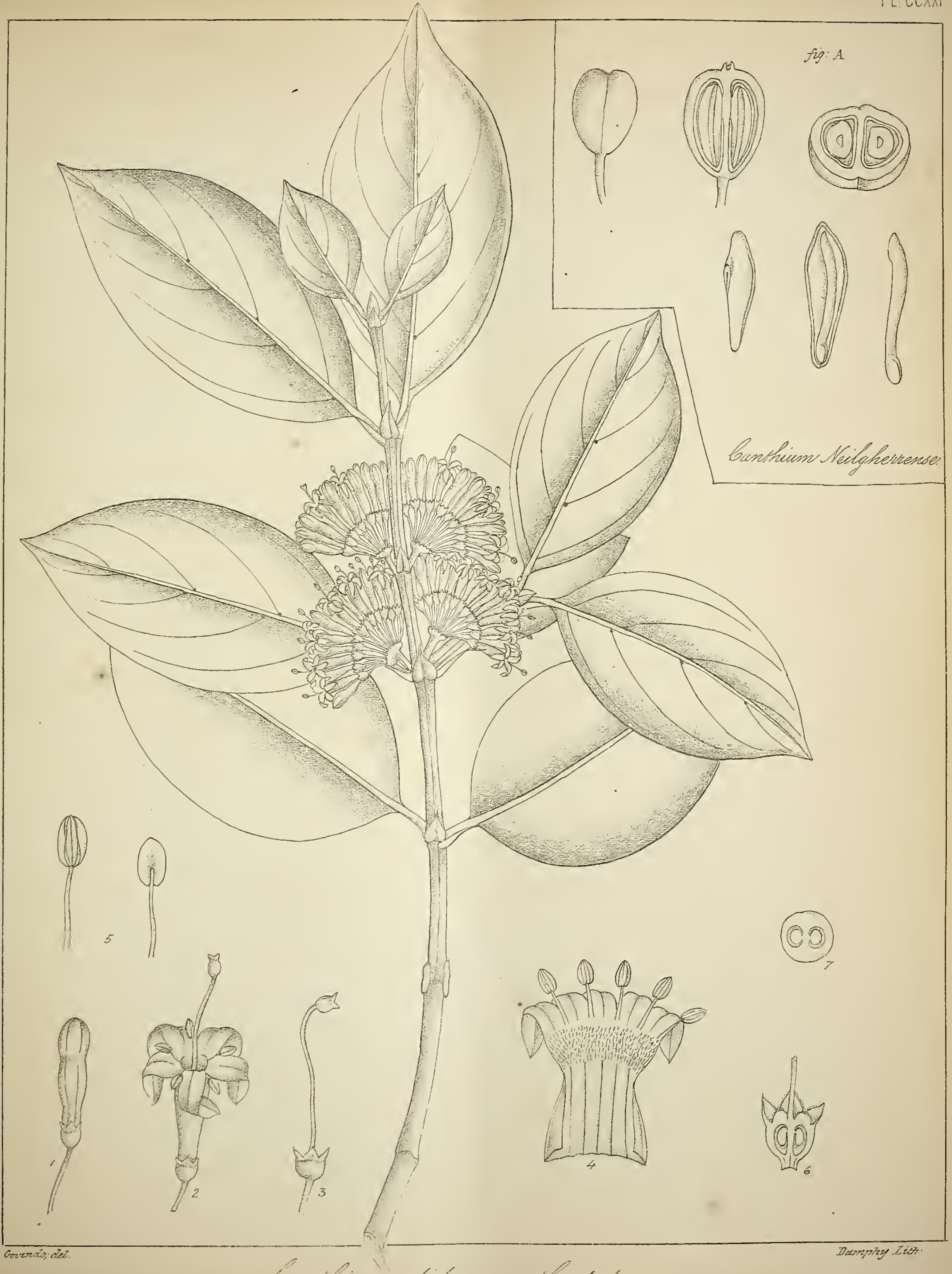
CANTHIUM. *Lam.*—GEN. CHAR. Calyx-limb short more or less toothed, corol-tube short or cylindrical, lobes 4-5 valvate in the bud, anthers exserted or rarely included in the tube, ovary 2 celled with 1 ovule in each cell laterally attached near or at the top, style exserted with a thick ovoid or mitre-shaped entire or 2-lobed stigma, fruit a globular compressed or didymous drupe, with 1 or 2 one-seeded pyrenes. Trees or shrubs unarmed or with axillary thorns, stipules interpetiolar pointed with a broad base, flowers in axillary cymes or clusters.

CANTHIUM DIDYMUM. (Gærtn.) A small or middling sized tree or sometimes only a shrub, unarmed, bark smooth, young branches 4 sided, leaves oval ovate elliptic or lanceolate, more or less acuminate, very coriaceous, quite glabrous on both sides and very shining above furnished with smooth hollow glands in the axils of the veins beneath, variable in size but generally about 3-5 inches long by $1\frac{1}{2}$-2 broad, petioles 4-5 lines long, cymes axillary peduncled or congested into a single short thick peduncle scarcely as long as the petiole and bearing numerous slender pedicels from its dilated apex, flowers white fragrant 5-merous, calyx teeth pointed or rounded often somewhat inconspicuous and deciduous, minutely ciliate, corol-tube hairy within at the apex, anthers on conspicuous filaments which are attached to near the centre of the back of the anther, style much exserted, stigma mitre-shaped and 2-lobed at the apex, drupe when ripe compressed and somewhat didymous broadly obovate and slightly emarginate. *Gœrtn. fr.* 3 *p.* 94. *t.* 196 ;—*WA. Prod. p.* 425. C. cymosum, *Pers.* C. umbellatum, *Wight Icones tab.* 1034. Psydrax dicoccos, *Gœrtn.* Webera cymosa, *Willd. Sp. p.* 1224. Rondeletia cymosa, *Poir.* Cupea cymosa, *DC.*

This very handsome tree with deep green foliage, is most abundant on most of the mountains in this presidency, particularly so on all the hills in the Salem district; it is called Nalla balsu both in Tamil and Teligu, Ursool on the Bombay ghats, and Tolan in the Ooria country ; it is also very common in Ceylon, where it is called Poruwa. The variety here figured was considered by Wight as a distinct species from the didymum of our eastern coast, but it only differs slightly in the inflorescence, and is not now considered specifically distinct ; the wood is close grained and hard, and very dark coloured in the centre.

Analysis.

1. A flower bud, showing the lobes valvate.
2. A full flower.
3. The same corol removed, showing the style and mitre-shaped stigma.
4. A corol opened out.
5. Anthers, front and back view.
6. Ovary cut vertically, showing the ovules solitary in each cell and attached to near the apex of the axis, and the prominently raised slightly hairy disk, which is hollow in the centre where the style enters.
7. Ovary cut transversely.



Govindo; del. Dunphy Lith.

Canthium didymum (Gærtn.)

IXORA PARVIFLORA. (Nat. ord. Rubiaceæ.)

IXORA. *Linn.*—GEN. CHAR. Calyx limb small, 4-5 toothed or lobed. Corol-tube slender, lobes 4-5 imbricate in the bud usually contorted, anthers usually exserted, ovary 2 celled with 1 ovule in each cell peltately attached to the axis at the centre or near the apex or rarely near the base, style exserted, entire or divided at the end into 2 stigmatic lobes, fruit a small globular berry or drupe, the endocarp not hard forming 2 one-seeded pyrenes seed broad with the inner face flat or more frequently very concave. Small trees or shrubs, flowers in terminal dense or large corymbs or panicles or in smaller axillary or lateral cymes, stipules interpetiolar pointed their broad bases often connate within the petiole.—Pavetta, *Linn.*

IXORA PARVIFLORA. (Vahl.) A small or middling sized tree, leaves from linear-oblong cuneato-obovate, bluntish or with a short point often slightly cordate at the base, coriaceous and hard, shining, 3½-4 inches long by 1-2 broad, petioles about 3 lines long, stipules with a longish subulate point, panicles corymbiform terminal trichotomous sessile or peduncled with often foliaceous bracts subtending the primary branches, flowers small white nearly ½ an inch long, crowded on the extreme sub-divisions, 4 merous, corol tube very slender, lobes oblong-linear obtuse reflexed, anther-cells produced into 2 longish narrow points at the base, filaments short attached to the back of the anther rather above the base. Style slightly hairy, stigma 2 lobed, lobes oblong erect, ovules attached to the centre or near the apex of the axis, berry somewhat didymous. *Vahl. Symb.* 3 *p.* 2 *t.* 52 ;—*WA. Prod. p.* 429.

This tree is common throughout this presidency and in Ceylon, it is well known as the Torch tree, as boughs of the green wood make excellent torches; it is called Masal-ka-jhar in Hindoostanee, Karipal in Teligu, Shulundu in Tamil, Korgi in Canarese, Koorat in Bombay, and Maha ratambalu in Ceylon. The wood is of a reddish brown colour, the grain hard very close and even, it is easily worked, gives a smooth surface and stands a good polish, and is well adapted for the lathe, and is in use for furniture and building purposes ; a cubic foot unseasoned weighs 78-84 *lbs., and* 66 *lbs. when seasoned, and its specific gravity is* 1·056 ; *it is of course excellent firewood, it is often planted in gardens, and is ornamental.*

Analysis.

1. A flower bud, showing the lobes imbricate.
2. A full flower.
3. The same, corol removed.
4. Corol opened out, showing the insertion of the stamens between the lobes.
5. Anthers, front and back view.
6. An ovary cut vertically, showing the ovules attached to the centre of the axis.
7. The same, showing the insertion of the ovules at nearly the apex of the axis.
8. Ovary cut transversely. (All drawn from fresh specimens.)

Govindo del. Dumphy, Lith.

Ixora parviflora. (Vahl.)

DIPLOSPORA APIOCARPA. (Nat. order Rubiaceæ.)

DIPLOSPORA. *DC.*—GEN. CHAR. Calyx limb short 4 toothed truncate, corol-tube short, lobes 4 spreading imbricate in the bud, anthers exserted, ovary 2-celled with many or rarely only 2 ovules in each cell attached to a small peltate placenta, style with 2 stigmatic lobes, fruit a globular berry, seeds solitary or few in each cell. Trees, flowers in axillary clusters or loose cymes or in pairs of clusters with one terminal one forming a short terminal panicle, stipules interpetiolar pointed with a broad base.--Discospermum, *Dalz.*

DIPLOSPORA APIOCARPA. (Dalz.) A large tree, polygamo-diæcious, branches tetragonal, leaves glabrous ovato-lanceolate with a blunt acumination up to 6-7 inches long by 2-3 inches broad furnished with hollow hairy glands in the axils of the veins beneath, petioles 6 lines long, stipules triangular glabrous, peduncles axillary about 2 lines long, flowers 3-8 subsessile, calyx urceolate truncate subentire or minutely and irregularly toothed furnished (as are the stipules) with a gummy substance, glabrous or with a few weak hairs on the outside, more or less hairy within the tube, filaments generally inserted near the apex of the tube a little below the lobes, but sometimes arising from near the base, stigma with 2 spreading flat lobes, cells of the ovary 4-8 ovuled, fruit globose with a circular ring-like scar at its apex, 8-9 lines in diameter, seeds flat, disk like, irregularly compressed 4-8 in each cell. *Dalz. Hook. Kew Journ. of Bot. vol.* ii. *p.* 257.

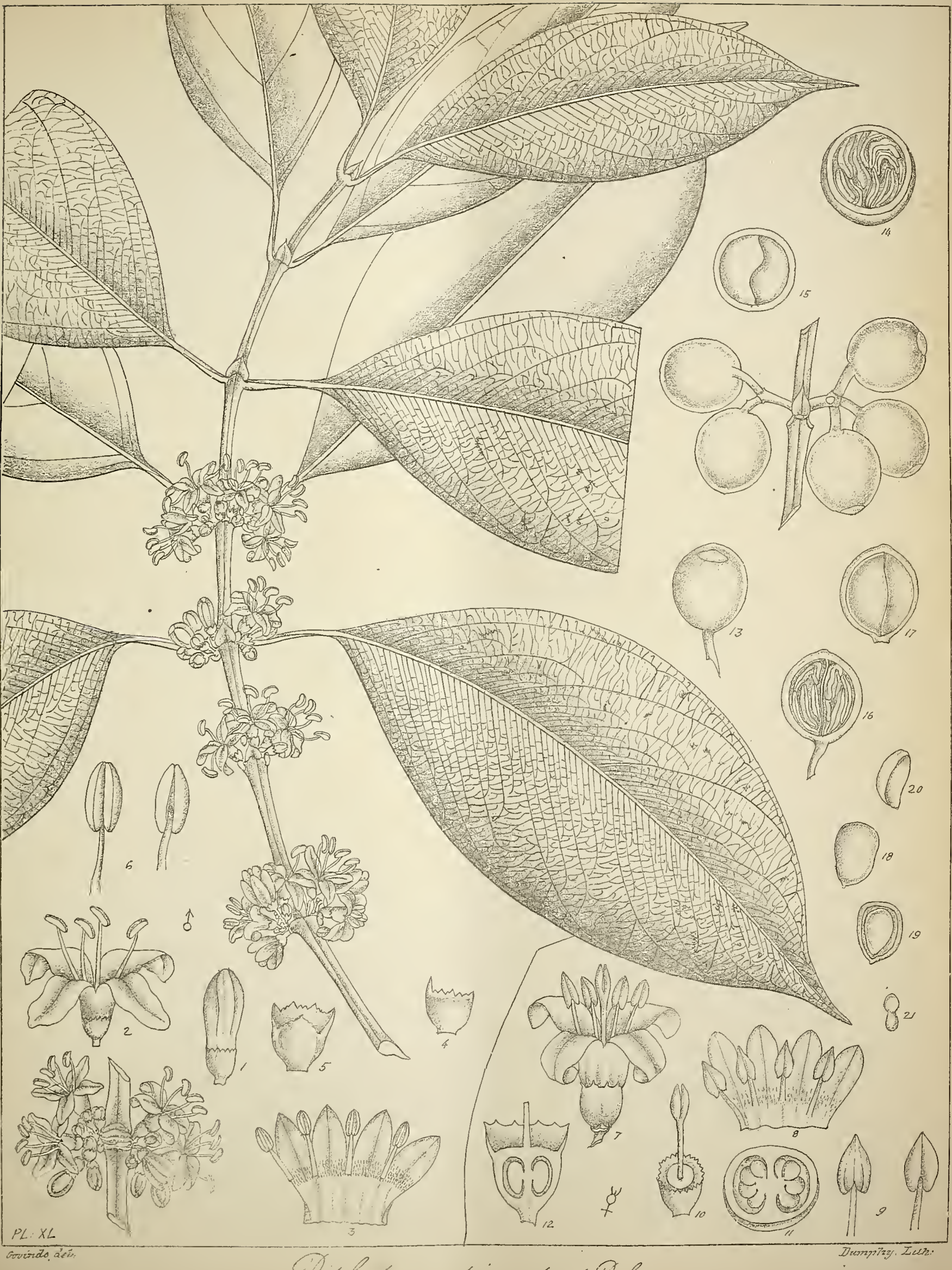
I have met with this tree on the Coimbatore hills (Muti-kolam 4500 *feet elevation), on the Sispara ghat (Nilgiris), and in the Wynad* (2800 *feet elevation), and Mr. Dalzell found it on the Bombay ghats ; it flowers in the rains and ripens its fruit in January. I know nothing of its timber.*

Analysis.

1. Flower bud showing the lobes imbricate.
2. A male flower.
3. Corol of the same opened out to show the insertion of the stamens.
4. A calyx.
5. A calyx cut through vertically, showing that there is no sign of an ovary.
6. Anther front and back view, filaments aduate to the centre.
7. A fertile flower.
8. Corol of the same opened out showing 3 of the filaments inserted nearly at the apex of the tube, the 4th nearly at its base.
9. Anthers from the same flower (quite sterile) front and back view, filament basifixed.
10. Ovary, style and stigma.
11. Ovary cut transversely.
12. Ovary cut vertically.
13. Ripe fruit showing the circular scar at the apex.
14. Transverse section of a ripe fruit, showing the 2 cells and the numerous flat closely packed disk-like seeds.
15. The other half of the fruit, the seeds removed.

16 & 17. Vertical sections of the fruit.

18, 19, 20 & 21. The seed and embryo. (All drawn from fresh specimens.)



Govindo del.

Dumphy Lith.

Diplospora apiocarpa. (Dalz.)

WENDLANDIA NOTONIANA. (Nat. order Rubiaceæ.)

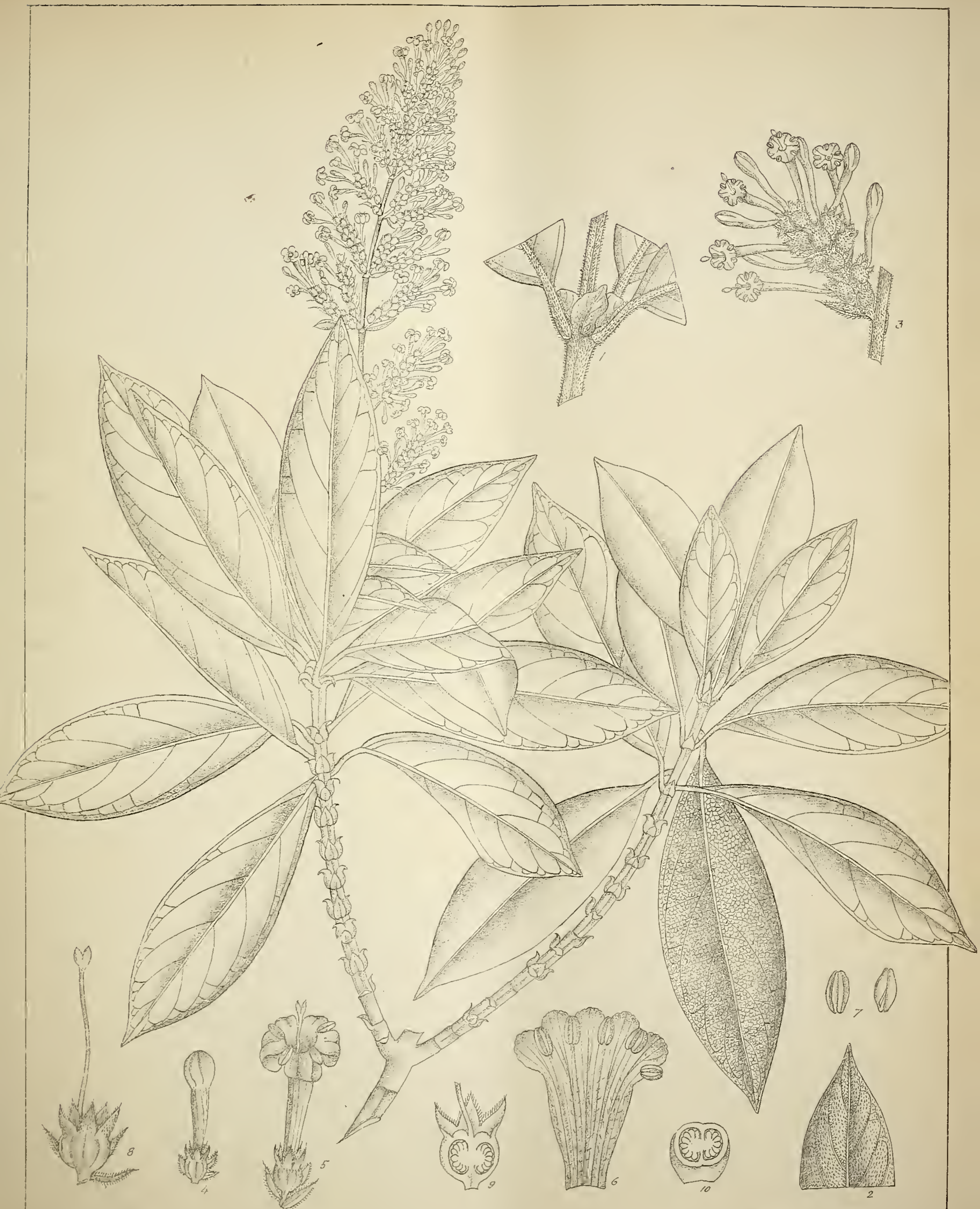
WENDLANDIA. *Bartl.*—GEN. CHAR. Calyx tube short rather globose, limb of 5 small persistent teeth, corol funnel-shaped the tube long and slightly wider towards the top, the limb spreading 5 lobed the lobes imbricate in æstivation, stamens 5, the filaments short arising from the apex of the tube between the lobes and attached to the centre of the anther, anthers oblong exserted, dish fleshy crowning the apex of the ovary, style filiform exserted, stigma 2-cleft divisions oval large. Ovary 2-celled, ovules numerous in each cell attached to a large placenta which rises from the centre of the axis. Capsule globose crowned with the limb of the calyx 2-celled splitting at the apex loculicidally. Seeds minute numerous. Trees or large shrubs, leaves in verticels of threes, or opposite, stipules large prominent, panicles terminal thyrsoid many flowered, flowers white small.

WENDLANDIA NOTONIANA. (Wall.) A small or rarely a middling sized tree, young shoots hirsute, leaves generally verticelled in threes sometimes simply opposite lanceolate, or rarely obovate lanceolate acute at the apex, upper side glabrous or sub-glabrous except the costa, underside minutely pubescent, 3-5 inches long by about $1\frac{1}{4}$-$1\frac{1}{2}$ broad, petioles 2-3 lines long, stipules large more or less hirsute ovate from a broad base sometimes bifid at the apex, branches of the panicle hirsute somewhat erect, flowers small white more or less crowded and forming interrupted spikes, calyx and bracts hirsute. Calycine teeth triangular acute ciliate, corol glabrous 6-8 times longer than the calyx, the tube widened at the mouth, lobes oval obtuse recurved, anthers with very short filaments. *Wall.* ;—*WA. Prod. p.* 403. W. bicuspidata, *WA. l. c.*

This small tree is common in most of our alpine and subalpine jungles from 2000 *to* 7000 *feet elevation. The timber is strong and used for various purposes by the natives.*

Analysis.

1. A magnified portion of a branch showing the verticel of 3 leaves and the 3 stipules.
2. Under surface of a leaf showing pubescence.
3. Magnified portion of a panicle.
4. A flower bud showing the lobes imbricate.
5. A full flower.
6. Corol removed and opened out, showing the insertion of the stamens between its lobes.
7. Anthers front and back view, showing the short filament.
8. A flower with the corol removed, showing the style and stigma.
9. Ovary cut vertically, showing the numerous ovules.
10. The same cut transversely.



Govindo del. Dumphy Lith.

Wendlandia Notoniana, (Wall.)

VERNONIA VOLKAMERIÆFOLIA. (Nat. order Compositæ.)

VERNONIA. *Schreb.*—GEN. CHAR. Capituli many-flowered. Florets all tubular and equal regular with 5 narrow lobes, involucre ovoid-globular or hemispherical, the bracts imbricate not longer than the florets, the inner bracts the longest, receptacle naked. Anthers obtuse at the base, style, lobes subulate achenes mostly striate or angular rarely cylindrical. Pappus of numerous capillary bristles usually surrounded by an outer row or very short often scaly bristles which are rarely entirely wanting. Rarely trees, generally herbs, shrubs or climbers, leaves alternate. Flower-heads terminal or in the upper axils in cymes or panicles or sometimes solitary.

VERNONIA VOLKAMERIÆFOLIA. (DC.) A good sized tree, young branches more or less pubescent, leaves sub-membranaceous elliptic to elliptico-obovate, acute at the base, irregularly crenate or crenately-lobed towards the apex 4-6 inches long by 1½ to 2½ broad, minutely glandular on both sides, in age glabrous above except the costa, beneath slightly puberulous, primary veins and transverse veinlets very prominent, petioles about 6 lines long, panicle terminal leafless cymose, rachis angled hoary or tomentose, bracts at the ramifications linear-oblong, flower-heads on rather slender pedicels laxly arranged at the ends of the branchlets, involucral bracts sericeous the outer ones short ovate, the inner narrow oblong, achenes glandulose, pappus very white, the outer bristles short. *DC. Prod.* v. 32.

I have only met with this tree on the South Travancore ghats at about 3000-4000 *feet elevation (Attraymallay ghat), and I do not think it occurs on the Nilgiris or any where north of the Palghat gap, but if it is the volkameriæfolia of DC. (and my specimens were named at Kew), it also occurs in Nepal. Its timber is soft and worthless; it is the only Compositæ known to me in this Presidency which grows to a tree except Monosis, but Vernonia Javanica, a considerable tree, occurs in Ceylon, and is probably also found in S. Tinnevelly or Travancore.*

Govindo del. | Dumphy & Lith.

Vernonia volkameriaefolia: (D.C.)

travancorica

MONOSIS WIGHTIANA. (Nat. order Compositæ.)

MONOSIS. *DC.*—GEN. CHAR. Capituli 1-flowered, the floret tubular and equal regular with 5 narrow lobes, involucre oblong the scales imbricate obtuse much shorter than the floret, anthers obtuse at the base without tails, style-lobes subulate, achenes glabrous terete, pappus 2-3 series bristles rigid scabrous equal. Trees or shrubs, leaves alternate, panicles naked the apices of the branchlets bearing numerous subumbellate sessile capituli, flowers rose-colored.

MONOSIS WIGHTIANA. (DC.) A good sized tree, branches terete velutino-tomentose, leaves from elliptic or oblongo elliptic to obovate, acute or rounded at the apex, cuneate, acute or obtuse or even subcordate at the base, quite entire or with irregular distant serratures, subglabrous except the veins above, velutino-hirsute beneath, 6-8 inches or more long by 2½-3½ broad, primary pinnate veins very prominent, petioles 6-12 lines long, panicles terminal very large much branched bracts of the lower ramifications large spathulate, flower-heads pedicelled or sessile at the apices of the sub-corymbose ramuli, involucral-bracts obtuse pubescent outside. *Wight. Icones tab.* 1085.

A very showy tree when in full flower in February and March ; it is abundant on the eastern slopes of the Nilgiris at 4000-5000 *feet elevation, and is also to be met with elsewhere on our western mountains (Anamallays, Pulneys, &c.) ; its wood is soft and worthless.*

... del.   Dunphy Lith.

Monosis Wightiana. DC.

VACCINIUM LESCHENAULTII. (Nat. order Ericaceæ.)

VACCINIUM. *Lindley.*—GEN. CHAR. Calyx tube adnate, the limb of 4-5 teeth, corol superior, the tube ovate campanulate or shortly cylindrical, the limb of 4-5 short lobes or teeth. Stamens double as many as the calyx teeth and corol lobes. Anther-cells elongated into long tubular points and opening at the apex of these in oblique pores, ovary inferior 4-5 celled with several ovules in each cell attached to the centre of the axis, fruit a berry. Trees or shrubs, leaves alternate, flowers showy.

VACCINIUM LESCHENAULTII. (Wight.) A small or middling sized tree, young shoots puberulous at length glabrous, leaves from oval to ovate, from pointed and mucronate to quite retuse at the apex, serrated, paler beneath, slightly puberulous on the costa and veins when young at length quite glabrous, $1\frac{1}{2}$-$2\frac{1}{4}$ inches long by 1-$1\frac{1}{4}$ broad, venation penniveined and looped within the margin, petals about 3 lines long puberulous, racemes axillary or terminal or on leafless shoots, flowers pink very showy, pentamerous, calyx-lobes ciliate and minutely green-gland tipped at the apex, filaments hairy dilated at the base narrowed upwards attached to near the apex of the lower portion of the anther-cells just between the 2 prominent bristles, stigma with a few black erect hairs. *Wight Icones tab.* 1188. V. arboreum, *Lesh. not Michx.* Agapetes ? arborea, *Dun. in DC. Prod.* vii. Andromeda symplocifolia, *Wall. l. n.* 1522.

A very pretty tree abundant on the Nilgiris at the higher elevations, and on the Anamallays, Pulneys, and Ceylon mountains; the fruit, which is about as large as currants, is eaten, it is an agreeable acid and makes good tarts; the tree is called Andoovan on the Nilgiris. The wood is rose colored, with a red heart, wavy grained and pleasant to work, and would be excellent for cabinet work.

Analysis.

1. A flower bud.
2. A full flower.
3. The same, corol removed.
4. The tubular corol removed and opened out.
5. A flower, corol and all the stamens except one removed, to show the disk, style, and insertion of the stamens.

6*A*. Anthers, front view, showing the hairy filament dilated at its base and the cells elongating into terminal tubular points with a pore at the apex.
6*B*. Anther back view, showing the filament adnate to the cells just between the 2 bristles.
6*C*. Anther, side view.

7. Ovary cut vertically.
8. Ovary cut transversely. (Drawn from fresh specimens.)

Govindo del.

Dunphy Lith:

Vaccinium Leschenaultii.

RHODODENDRON ARBOREUM. (Nat. order Ericaceæ.)

RHODODENDRON. *Linn.*—GEN. CHAR. Calyx free 5 lobed or toothed; corol obliquely campanulate rarely contracted into a narrow tube, or rotate with scarcely any tube, 5 lobed or very rarely 10 lobed; stamens 10 or rarely more declinate, anthers without awns, the cells opening in terminal pores; ovary 5-10 celled; capsule opening septicidally in 5-10 valves. Trees or shrubs, leaves ever green entire often with a mealy or scaly pubescence; flowers in dense terminal corymbs or heads or rarely solitary issuing with the young leaves from scaly buds.

RHODODENDRON ARBOREUM. (Smith.) A small or middling sized tree sometimes of considerable girth, leaves crowded at the ends of the branches very coriaceous lanceolate entire or slightly waved at the margin, glabrous above except the costa, densely rusty beneath with copious close set brown scales, 3-4¼ inches long by 1¼-1½ broad, pinnate veins very prominent thick and much raised on the under surface of the leaf, reticulated veinlets and venules very numerous and forming a very beautiful minute net work (as seen under the lens when the dense mass of rusty scales is removed), petioles 4-7 lines long furnished with blackish pubescence, flowers 1½ to nearly 2 inches long bright crimson or rarely white or pale rose arranged in dense terminal compact heads or corymbs, pedicels 4-5 lines long, densely covered as is the calyx with stellate pubescence which is snow-white when in flower and reddish when in young fruit, a large very membranaceous silky obovato-spathulate pointed concave bract (about 1 inch long and ½ inch broad) at the base of each pedicel and 2 small subulate bracteoles on the pedicel either both near the base or one of them, sometimes at the centre, all soon becoming scariose and early deciduous, calyx small rather irregularly 5-lobed, corol broadly tubular, the limb shortly 5-lobed, the lobes emarginate, stamens 10 very unequal in length, anther-cells broader upwards, filaments attached to near the apex at the back, ovary densely sericeous with silky white hair, stigma large capitate depressed and hollow in the centre, young fruit dotted with reddish-brown stellate pubescence, capsule narrow oblong slightly recurved quite glabrous in age about 1 inch long. *Smith in DC. Prod.* vii. 720.

This very gorgeous tree is most abundant on the Nilgiris, Pulneys, Anamallays and Ceylon mountains, from an elevation of 4800 *upwards, and if it is the true R. arboreum, it is also found in the Himalayas; but it is said to differ somewhat from the Himalayan tree, particularly in the pubescence on the under surface of the leaves, and was long ago distinguished as R. nobile, though since joined with arboreum. I have however no specimens of the Himalayan tree for comparison, but I have given a most detailed description and careful analysis from fresh specimens. The wood is occasionally used for gun stocks, posts and other purposes ; it is close in the grain, but wanting in fibre and shrinks and twists in seasoning. The tree is called Billee and Poomaram on the Nilgiris, and Ma-ratmal in Ceylon ; it is to be found in flower all the year round, but most profusely so in February.*

Analysis.

1. Under surface of a leaf showing the dense matted pubescence and the prominently raised veins.
2. A flower bud with the large bract and 2 bracteoles.
3. A full flower.
4. The large concave bract.
5. Front and back view of the bracteoles.
6. A flower, corol removed to show the 10 declinate unequal stamens, the bract and bracteoles attached to the base of the pedicel.
7. Corol opened.
8. Ovary and style.
9. Pedicel and calyx, showing the two bracteoles attached to the base of the flower.
10. The same only with one of the bracteoles attached half way up the pedicel.
11. The stellate tuft of hairs which forms the pubescence on the calyx and pedicels.
12. Anther front view, showing the 2 pores at the apex of the cells.
13. Anther back view, showing the attachment of the filament.
14. The same, side view.
15. Ovary cut vertically.
16. Very young fruit cut transversely.
17. Young fruit.
18. The ripe capsule burst septicidally (the seed removed), showing the valves separated from the plancentiferous axis which bears the seed.
19. Inside view of one of the valves.
20. Side view of a portion of the same. (Drawn from fresh specimens.)

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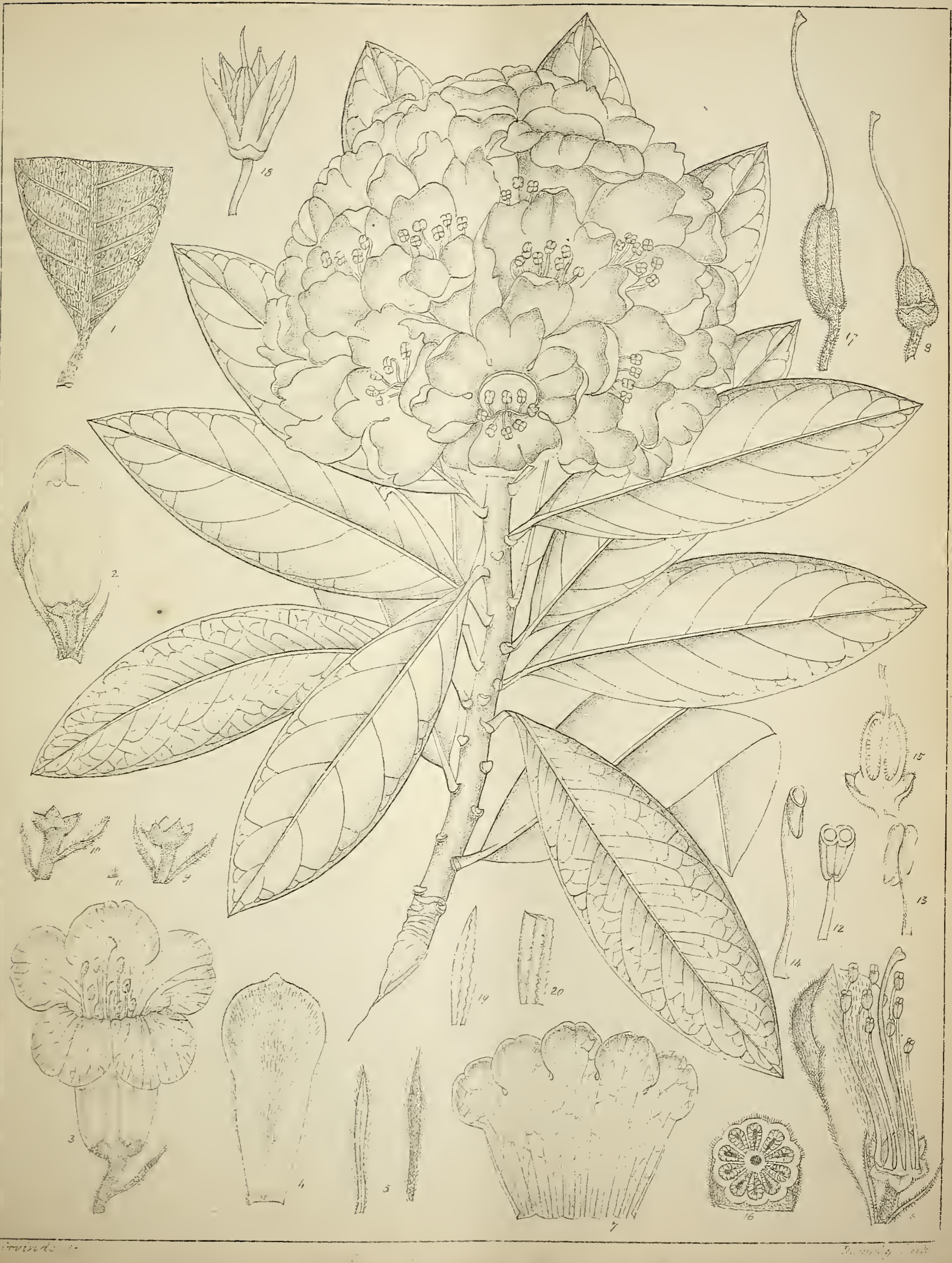


ORDER VII-A.—VIOLARIEÆ.

Gen. Char. Flowers hermathrodite or rarely polygamous, irregular, or regular, sepals 5 equal or unequal imbricate in æstivation, petals 5 nearly equal or the lower larger unguiculate or sessile, stamens 5 free or monadelphous, anthers erect 2 celled with the connective generally produced beyond the cells, ovary sessile 1-celled, placentas usually 3, each with 1-many anatropous ovules, style usually simple sometimes clavate, stigma terminal or lateral, fruit a capsule dehiscing loculicidally or septicidally 1-many seeded, seeds with a fleshy albumen and axile embryo. Herbs, shrubs or small trecs, leaves usually alternate entire serrate or crenate stipulate, flowers axillary or terminal solitary fascicled racemose or panicled, small in the woody specics.

A small order only represented in Southern India by one small tree Alsodeia Zeylanica first discovered in Ceylon, and now detected in South Travancore and in the Wynad. Of herbaceous plants this order gives us 2 indigenous species of Viola and 2 of Ionidium and 1 species of Scyphellandra, a small undershrub found in Ceylon.

ALSODEIA. Thouars.

Gen. Char. Sepals not produced at the base, petals equal or nearly equal exunguiculate or nearly so, filaments connate the anthers inserted upon or within the margin of the tube or free usually with a conspicuous dorsal or terminal connective produced beyond the cell, placentas 1 many ovulate, style straight with a terminal stigma. Capsule 3 valved opening loculicidally few seeded, seeds round or angulate glabrous or cottony. Shrubs or trees, leaves usually alternate serrate or crenate or entire, flowers small axillary or terminal fasciculate racemose or paniculate, rarely solitary.—Vareca, *Roxb.* Pentaloba, *Lour.* Prosthesia, *Blume.* Medusa, *Lour.*

Alsodeia Zeylanica. (Arnt.) A small trec or large shrub, branchlets terete, the young parts very minutely puberulous. Leaves lanceolate to ovato-lanceolate acuminate 2½-6 inches long by 1-3 broad, shining beautifully reticulated, minutely dentate furnished with hairy glands in the axils of the veins beneath, petiolcs 2½-5 lines long deeply channelled above. Stipules linear lanceolate acute minutely hairy at the centre of the back and ciliate, 3-4½ lines long, dcciduous. Flowers polygamous in small many bracteoled fascicles in the axils or at the axils of thc fallen leaves, bracteoles acute minutely ciliate, pedicels 1-2 lines long, flowers very small white, calycine-segments ovate lanceolate acute slightly hairy, petals recurved at the apex more than twice as long as the sepals, stamen-tube 5 lobed the lobes crenated, the stamens inserted on the inside of the tube about its centre and opposite the lobes small and sterile in the female, the connective large particularly in the male, petaloid and much produced at the side and terminating at the apex in a large rounded lobe, anther-cells introrse, ovary 3 ovuled (small and sterile in the male) stigma small entire or subentire.—Pentaloba Zeylanica, *Arnt. Mag. of Zool. and Bot.* ii. 543. Alsodeia, *Thw. En. Pl. Zey. p.* 21.

I have found this small tree in the Travancore forests near Colatoorpalay and also in the Wynad. I have no specimens of the Ceylon plant for comparison, and Dr. Thwaites informs me that that is devoid of the hairy glands in the axils of the veins on the underside of the leaves. Specimens I forwarded to Kew were however named as above. No mention has been before made of any specics of this genus being polygamous which this certainly is. The Travancore plant was in flower and ripe fruit in August.

Analysis.

1, 2. Bud and full flower (male.)
3. The same, open.
4. Stamens removed, showing the stamen-tube and small sterile ovary.
4. The same calyx-tube opened out to show the attachment of stamens.
5. Anther, front view.
6. Auther, back view.
7, 8, 9. Fertile flowers showing the large ovary, style and stigma, and the attachment of the sterile stamens.
10. Sterile stamens, front and back view.
11. Ovary cut transversely, showing that it is 1-celled with 3 parietal placentas.
12. The same more advanced cut vertically.
13. Young fruit.
14. Nearly ripe fruit cut vertically.

Govindo, del. Dunphy Lith.

Alsodeia zeylanica (Arn.)

STERCULIA HAYNII. (Nat. order Sterculiaceæ.)

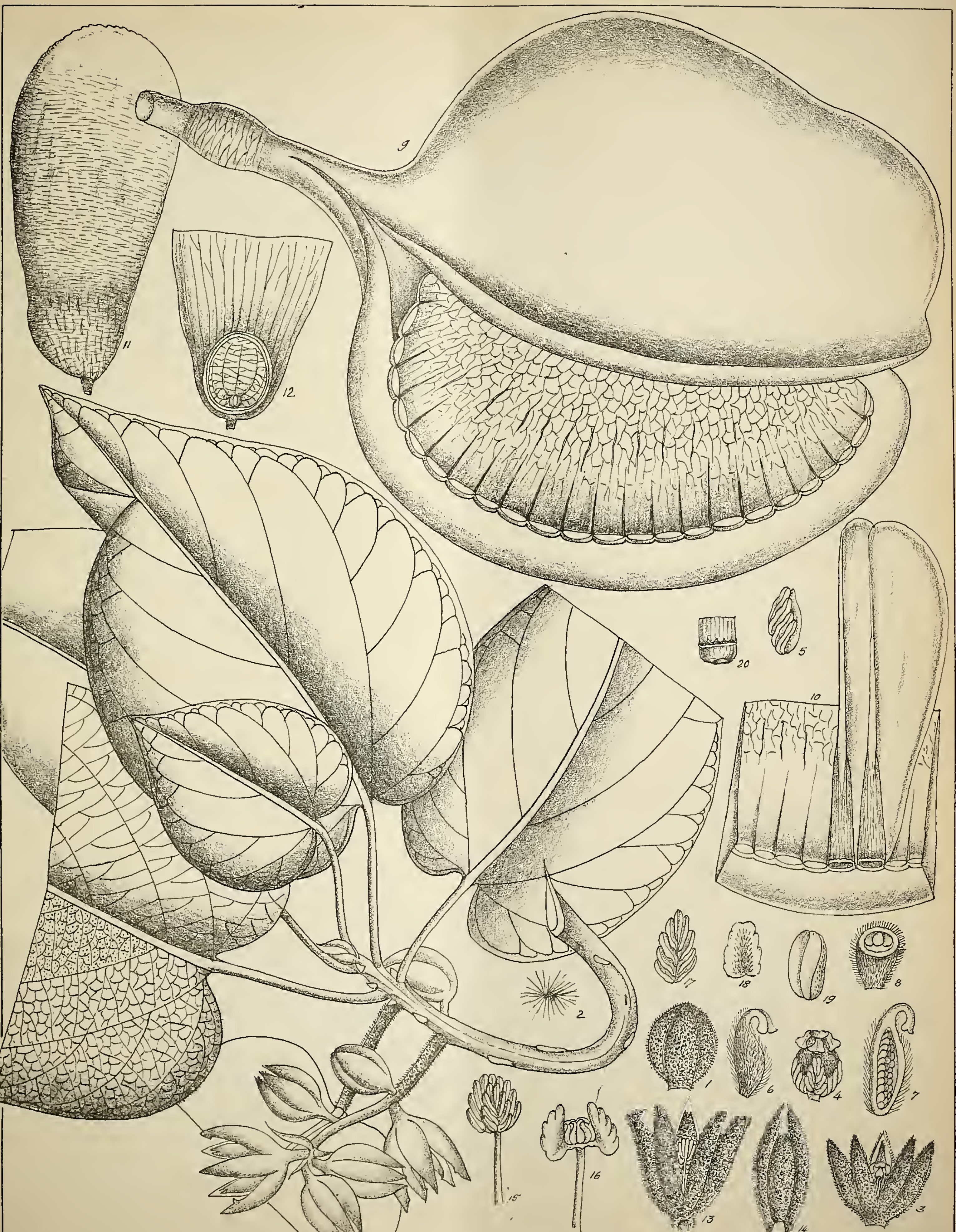
For Gen. Char. see letter press to Plate cv.

STERCULIA HAYNII. (Bedd.) A large tree young parts covered with dense golden stellate pubescence, leaves about the extremities of the branches submembranaceous cordate acute entire or slightly undulate 7 nerved, 4-6 inches long by 3-5 inches broad, when young covered with stellate pubescence in age quite glabrous, petioles 1-2 inches long stellately pubescent, racemes from the old axils below the leaves much shorter than the leaves few flowered, flowers 9-10 lines long on very short pedicels, calyx of 5 lanceolate segments densely covered with stellate pubescence, petals none. *Male*, staminal column slender $\frac{3}{4}$ the length of the calyx bearing 5-6 very small sterile ovaries at its apex round which are arranged regularly 4-5 phalanges of stamens each bearing on the outside 4 anthers, 2 on each side, anther cells linear oblong flexuose. *Female or hermathrodite*, ovaries 5 sessile, pubescent, styles recurved 2 lobed, ovules very numerous in 3 rows on the ventral suture, phalanges of stamens 4-5, sessile round the base of the ovaries very similar to those in the male, follicles depresso-globose about 5 inches in diameter on stalks $1\frac{1}{2}$ inches long, hard and woody outside and furnished with stellate pubescence, soft and corky on the inside, dehiscing along the ventral suture where the seeds lie in 2 rows, their short hard grey woody funicle fitting into little deep pits, seeds about 40, furnished with a soft corky oblong wing which with the seed is 3 inches long and nearly $1\frac{1}{2}$ inches broad, cotyledons not separable from the mealy albumen, radicle small close to the hilum.

This interesting tree has just been discovered on the Tinnevelly ghats by Mr. Hayne of the Forest Department, it belongs to the Section Pterygota and it differs from the Ceylon Sterculia (Pterygota) alata in many respects, particularly in the shape and texture of its leaves and in its flowers and seed being 3 *times as large. I have not seen the fruit of the Ceylon tree, this tree however answers so well to Roxburgh's description of Sterculia alata, Fl. Ind.* iii. *p.* 152, *that I have a suspicion that it may be his tree, in which case the Ceylon tree will be a new species. The tree is called by the natives Kodathanee.*

Analysis.

1. A young flower nearly globose showing the valvate sepals.
2. Magnified hairs which form the stellate pubescence on the inflorescence and young leaves.
3. A female flower 5 sepals, no petals.
4. The same, the calyx removed showing the 5 sessile ovaries closely adnate and the sessile phalanges of stamens.
5. Side view of a phalanx of stamens.
6. A single ovary.
7. The same cut vertically showing the 3 rows of ovules on the ventral suture.
8. The same cut transversely.
9. A follicle (life size) after dehiscence, the seeds removed.
10. Portion of the same showing the insertion of the seeds.
11. A seed (life size.)
12. The same cut vertically showing the radicle close to the hilum.
13. A male flower.
14. A sepal.
15. The column of stamens removed from the male flower showing 4 phalanges of stamens (there are often 5.)
16. The same, 2 phalanges removed to show the 6 sterile ovaries (there are often only 5.)
17. A phalanx of stamens, outside view.
18. The same, inside view.
19. An anther cell burst.
20. The hard woody funicle at the base of the seed, this fits into the pits shown along the ventral suture in figures 9 and 10; there are 2 rows of these pits separated by the gaping mouth of the follicle after dehiscence.



Govindo, del.   Dunphy, Lith.

Sterculia Haynii. (Bedd.)

HEMIGYROSA DEFICIENS. (Nat. order_Sapindaceæ.)

For Gen. Char. see letter press to Plate cli.

HEMIGYROSA DEFICIENS. (WA.) A middling sized or small tree, leaves 1·2 feet long abruptly pinnate, petiole terete smooth, leaflets 5-7 pair opposite sub-opposite or alternate, lanceolate to linear-oblong obtusely acuminated, entire, quite glabrous on both sides, 5-9 inches long by $1\frac{1}{4}$-$1\frac{3}{4}$ broad, petioles 2-4 lines long, racemes paniculate solitary or congested on the old axils or from nodes on the boughs, densely villous very variable in length from 2 inches to nearly 2 feet long, calyx leathery and densely villous, 5 parted much imbricate the 2 outer segments generally much smaller than the others, petals 4 crenulate or subentire equal or subequal oblong to obovate with a short claw glabrous in the upper half densely villous towards the base at the back and furnished inside with a large entire hairy scale which is $\frac{1}{2}$ or more than $\frac{1}{2}$ as long as the petal. *Male flowers* : disk incomplete 3 angled unilateral, stamens 8-10 rarely only 6, unilateral slightly exserted, filaments very hairy no rudiment of an ovary. *Hermathrodite flowers*, disk incomplete 3 angled unilateral, ovary hairy slightly 3-lobed 3-celled, stamens 8 regularly arranged round the ovary included, filaments hairy, anthers fertile but smaller than in the male, style short thick hairy, stigma large umbilicate nearly entire papillose, ovules solitary attached to the centre of the axis, fruit unknown.—Sapindus ? deficiens, *WA. Prod. page* iii. Anomosanthes, *Benth. and Hook. Gen. Pl.* 1 *p.* 402, and *Bedd.* vide *Manual p.* lxxii.

Tinnevelly ghats, common 2-4000 *feet elevation. Anamallays (head of the ghat from Palghat up to the Nelliampatty coffee estates)* 2500 *feet elevation, and towards the higher ranges at* 5000 *feet elevation. I have only lately met with this tree in the localities above mentioned, and there can be no doubt as to its being a true Hemigyrosa, the male trees are far more abundant than the fertile ones, it appears to be in flower all the year round as I found it in flower in Tinnevelly in September, and on the Anamallays in March, but of very many trees examined only one had hermathrodite flowers and there was no fruit, the male racemes are sometimes of great length though generally only a few inches long, the genus differs from Sapindus in its irregular flowers and unilateral disk and in its inflorescence being lateral instead of terminal.*

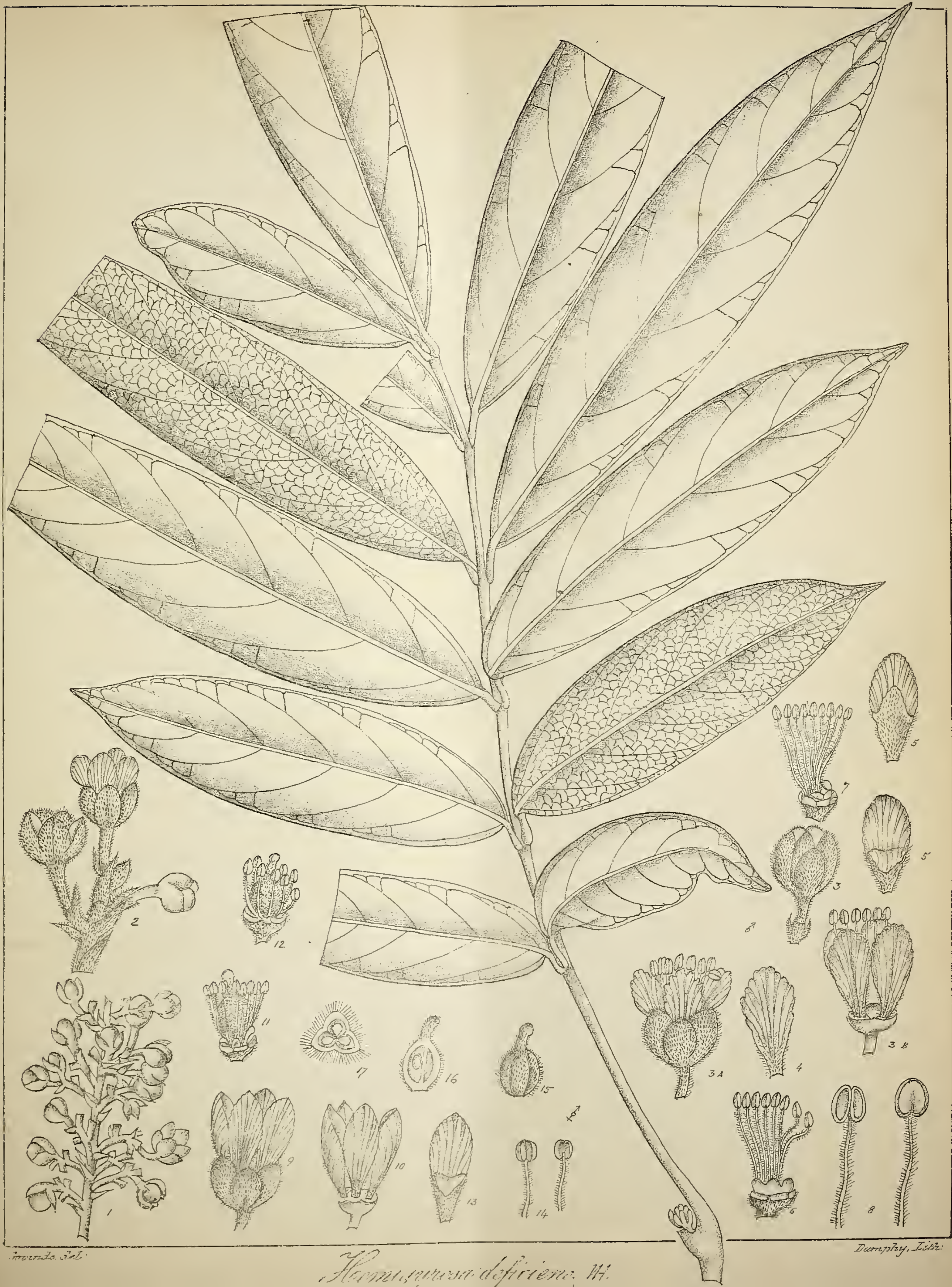
Analysis.

1. A small portion of the paniculate raceme (from a raceme 18 inches long.)
2. Highly magnified portion of the same.
3. A male flower bud.

3*a*. Full male flower with 8 stamens.
3*b*. A male flower, sepals removed showing only 6 stamens.

4. Petal, outside view.
5. The same inside view, showing the large entire scale.
6. A male flower, sepals and petals removed showing the unilateral 3 lobed-disk and 8 stamens.
7. The same showing 10 stamens.
8. Anthers, front and back view.
9. Hermathrodite flower.
10. The same, sepals removed.
11. The same, sepals and petals removed showing the unilateral 3-lobed disk and 8 stamens regularly arranged round the ovary.
12. The same seen from the side opposite the disk.
13. A petal, inside view.
14. The anthers, front and back view.
15. The slightly lobed hairy ovary and style and the oblique entire papillose stigma.
16. Ovary cut vertically the cells with a solitary ovule attached to the centre of the axis.
17. The same cut vertically.

N. B.—As the only supposed species of Anomosanthes turns out to be a Hemigyrosa, the genus Anomosanthes must be expunged from the Manual.



Govindo Del. Dunphy, Lith.

Hemigyrosa deficiens. W.

SEMECARPUS TRAVANCORICA. (Nat. order Anacardiaceæ.)

For Gen. Char. see letter press to Plate clxvi.

SEMECARPUS TRAVANCORICA. (Bedd.) A very large tree, leaves glabrous oblong rounded at the apex, or occasionally lanceolate and terminating in a fine point, very coriaceous, dark green and very shining above paler beneath, generally about a foot long by 5-6 inches broad, (but on young trees up to $2\frac{1}{2}$ feet in length,) petioles about 2 inches long, veins and reticulated veinlets very prominent particularly beneath, panicles axillary and terminal about as long as the leaves spreading and compound, flowers 5-6 merous the calyx slightly puberulous and ciliate, the male with a large turbinate rudiment of an ovary, drupe obliquely oblong rounded at the apex about 1 inch long, hypocarp broad and short.

This is an exceedingly handsome tree on account of its shining dark green foliage, it is very common in the moist forests on the Tinnevelly and Travancore mountains (elevation 1000-3000 feet), it abounds with the same caustic black juice as S. anacardium, it flowers in August and September and ripens its fruit in the cold season, it is called in Tamil Natu Shengote.

Analysis.

1. A 5-merous male flower bud.
2. The same expanded.
3. The same petals removed, showing the turbinate rudiment of an ovary and the insertion of the stamens.
4. Anthers, front and back view.
5. A 6-merous male flower.
6. Portion of a panicle in fruit (drawn from a dried specimen.)
7. Seed.
8. Vertical section of the same.
9. Transverse section of the same.

The following species has lately been discovered on the Tinnevelly mountains by Mr. Hayne and should be added to the Manual at page lxxxi.

14. SEMECARPUS AURICULATA. (Bedd.) A good sized tree, leaves oblanceolate with a small blunt acumination very gradually attenuated at the base and there furnished with 2 rounded lobes just above the petiole, glabrous of a dull green color, costa slightly rusty, margin membranaceous, about 7 inches long by $1\frac{3}{4}$ broad above the middle, venation prominent beneath, petiole 2-3 lines long, drupe obliquely obovate about 6 lines broad by 4-5 lines high supported on a short broad cup-like hypocarp.

Govinda del. Dumphy Lith.

Semecarpus Travancorica. (Bedd.)

SOLENOCARPUS INDICA. (Nat. order Anacardiaceæ.)

SOLENOCARPUS. *WA.*—GEN. CHAR. Flowers hermathrodite, calyx small 4-5 cleft, lobes deciduous, petals 4-5 valvate at length reflexed disk annular 8-10 crenated, stamen 8-10 inserted below the margin of the disk on the outside, filaments all equal in length, ovary free sessile 1 celled, style thick clavate, stigma oblique truucated, ovules pendulous from one side near the apex of the cell, drupe small oblong, pericarp cellular replete with fragrant oil, putamen hard bony, seed liuear compressed, cotyledons linear plano-convex, radicle superior short. A tree, leaves unequally pinnate, panicles fascicled at the apex of the branches, flowers very small white.

SOLENOCARPUS INDICA. (WA.) A small or middling sized tree young shoots and young leaves minutely puberulous, leaves fascicled at the ends of the old branches and alternate on the young ones, unequally pinnate, 6-12 inches long, leaflets 5-7 opposite or sub-opposite pair with an odd one, narrow oblong from an equal base, acuminate slightly crenulated glabrous or subglabrous in age, 2-2½ inches long by 8-9 lines broad, petiolules 1-1½ lines long, panicles numerous fascicled at the apices of the old branches, flowers very numerous small pure white, petals 4-5 reflexed, disk 8-10-lobed, stamens 8-10, equal in length, fruit oblong 3 lines long 1½ lines in diameter. *WA. Prod. p.* 171.

This tree is very beautiful when in blossom, being a perfect mass of white flowers. I found it in flower and ripe fruit this March on the Anamallays (2600 *feet elevation) near the head of the ghat leading up from Palghat to the Nelliampaddy coffee estates and it also grows on the Tinnevelly ghats, when in leaf only it much resembles the Spondias mangifera.*

Analysis.

1. A flower bud.
2. A 4-merous flower, 4 petals and 8 stamens.
3. A 5-merous flower, 5 petals, 10 stamens.
4. A 5-merous flower fully expanded, petals recurved.
5. The same petals and all the stamens but one removed showing the disk, ovary and style and the iusertion of the stamens.
6. Anthers, front and back view.
7. Ovary cut vertically showing the solitary ovule pendulous from near the apex.
8. The fruit.
9. The same cut transversely showing the oil-cells in the pericarp aud the bony putamen or stone.
10. The putamen removed from the drupe.
11. The same cut vertically.
12. The embryo showing the short superior radicle and linear cotyledons.
13. Branch of fruit (life-size.)

Govindo del.

Dunphy Lith.

Solenocarpus Indica (W.A.)

MYRSINE CAPITELLATA. (Nat. order Myrsineæ.)

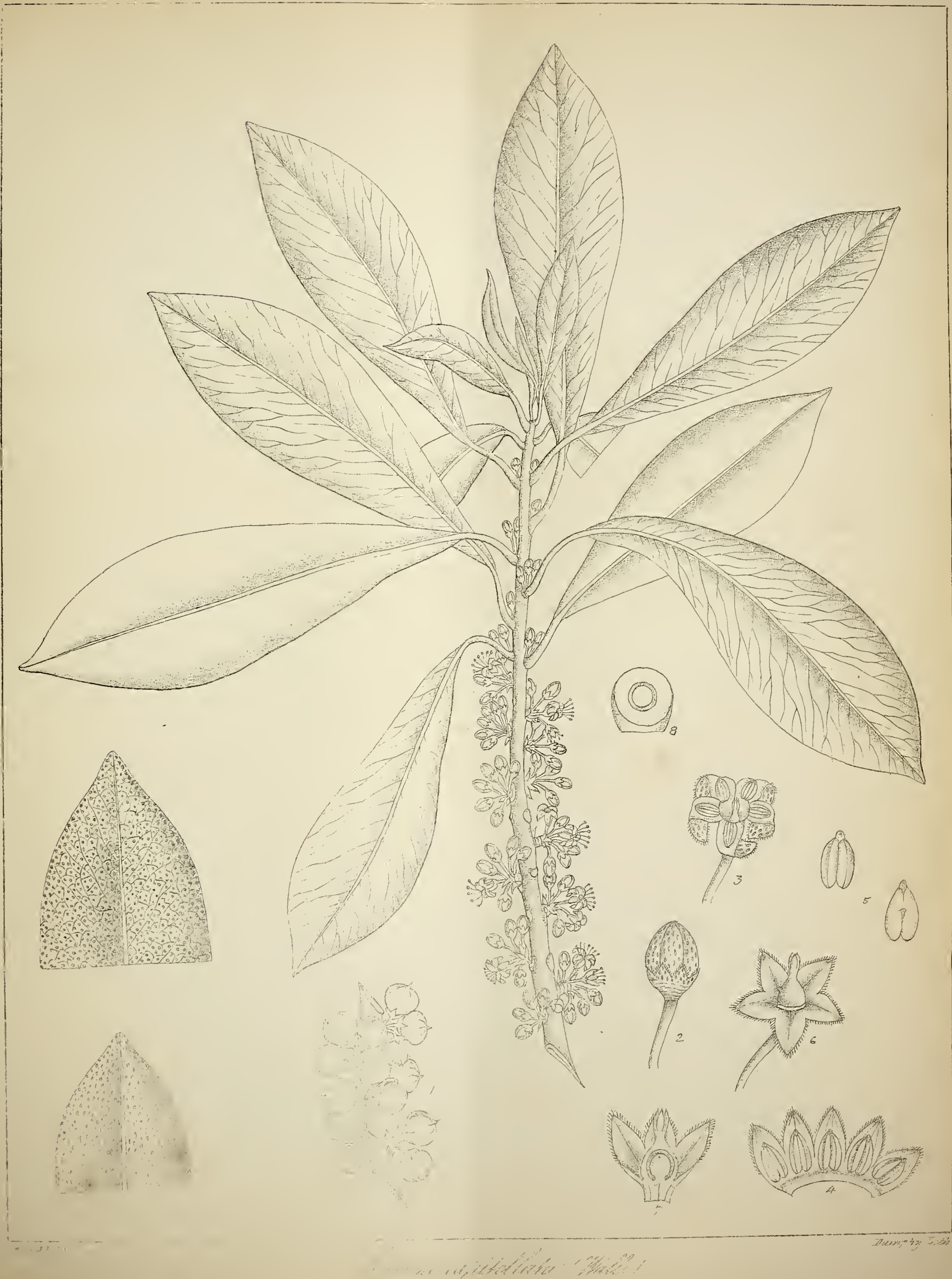
MYRSINE. *Linn.*—GEN. CHAR. Calyx free 4-5 toothed, corol deeply 4-5 lobed. Stamens inserted at the base of the corol-lobes sessile or subsessile, the anthers erect and lanceolate, ovary superior, style short with a capitate or fringed stigma. Trees or shrubs, leaves coriaceous entire or rarely toothed, flowers small often polygamous in umbels or clusters, sessile in the axils or at the nodes usually on the old wood, bracts minute deciduous.

MYRSINE CAPITELLATA. (Wall.) A tree, often polygamous, leaves glabrous coriaceous lanceolate elliptic or oblong or narrow obovate 3-4 (rarely 7) inches long by $\frac{3}{4}$-$1\frac{1}{4}$ broad, obtuse or bluntly acuminated, gradually narrowed at the base into the petiole quite entire punctate, pale beneath, the lateral veins inconspicuous, petioles 4-6 lines long, flowers very small greenish with red glandular raised blotches on the corol and calyx, fascicled in small clusters in the old axils or nodes, pedicels 1-2 lines long rarely wanting, bractes imbricate ovate, calyx 5 toothed minutely gland-ciliate, corol about 2 lines long, deeply 5 cleft slightly ciliate, anthers sessile or subsessile, stigma blunt or 2-3 lobed, fruit globose 2 lines in diameter, reddish when ripe. *Wall. Roxb. Fl. Ind.* ii. 295.

This tree is very common on the Nilgiris, particularly about Ootacamund, and is also found throughout our western mountains and in Ceylon from no great elevation up to the highest altitudes ; its timber is hard and durable and used for various purposes by the natives ; the fruit is eaten, it is very variable as to the shape and size of the leaves and length of the pedicels.

Analysis.

1. Fruiting branch (magnified.)
2. A flower bud, showing the valvate petals and the raised glandular marks on the calyx and corol.
3. A full flower.
4. Corol removed, showing its ciliate lobes and perfectly sessile stamens.
5. Anthers, front and back view.
6. Fertile flower, corol removed, the stigma 3-lobed.
7. Ovary cut vertically, showing the solitary erect ovule.
8. Ovary cut transversely.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Dunphy Lith.

ACHRAS ELENGIOIDES. (Nat. order Sapotaceæ.)

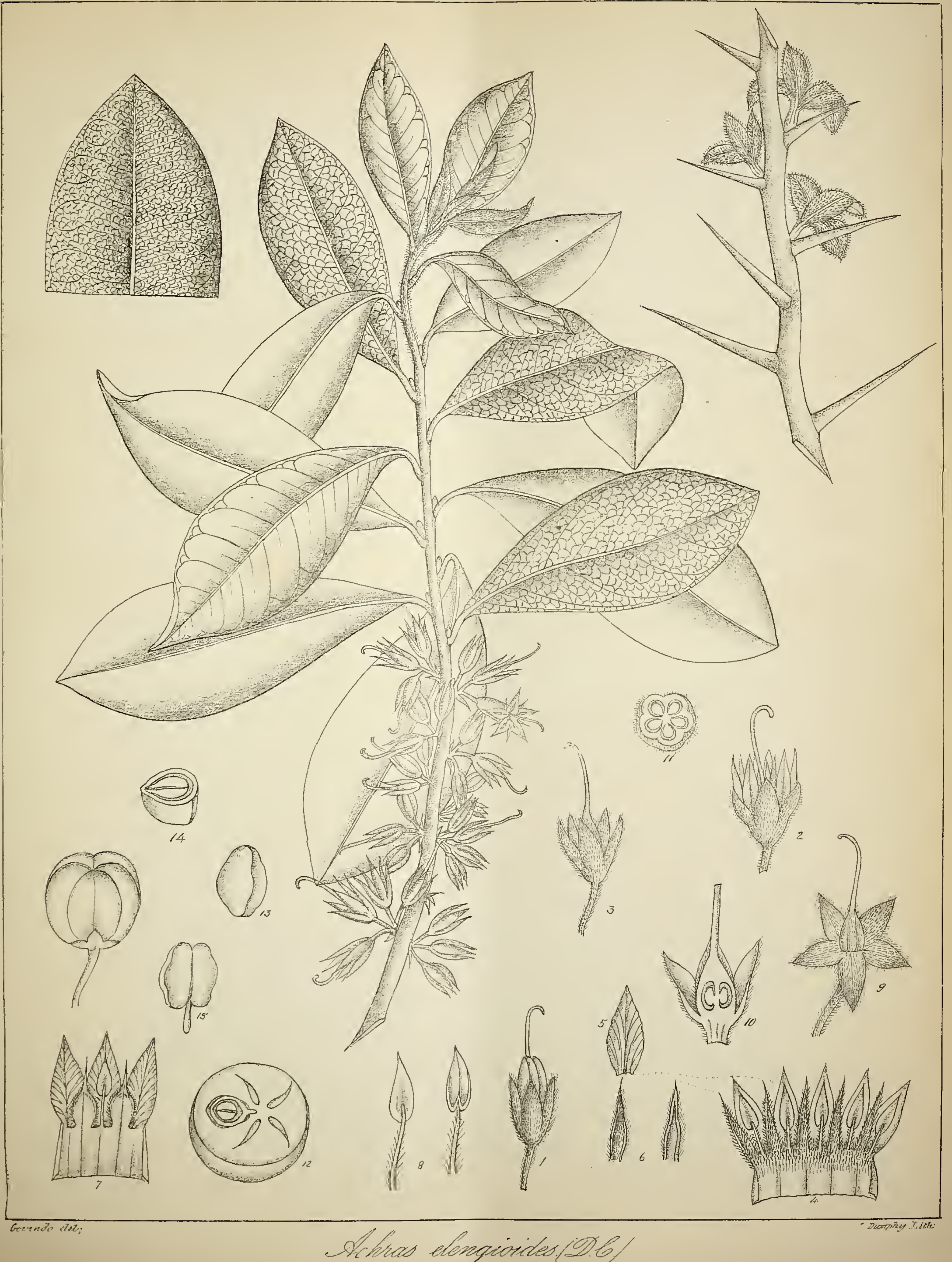
ACHRAS. *Linn.*—GEN. CHAR. Calyx lobes, corol lobes, stamens and ovary cells 5 or rarely 6 or more (in the cultivated West Indian A. sapota), the ovary cells twice as many, scales (or staminodia?) in the throat of the corol alternating with the lobes, anthers extrorse, ovules laterally attached, seeds solitary or few rarely all perfect; testa hard shining, hilum lateral linear or broad above half as long as the seed, albumen copious fleshy, cotyledons broad flat usually thin. Trees or shrubs, glabrous or tomentose, flowers sessile or pedicellate clustered.—Sapota, *A. DC.*

ACHRAS ELENGIOIDES. (DC.) A large tree with a very rough cracked bark, branches often spinous, spines 1-2 inches long, young parts ferrugineo-tomentose, leaves subcoriaceous elliptic or lanceolate or somewhat obovate narrowed at the base obtuse or acute at the apex, entire, glabrous in age, 2-3 inches long by $1\frac{1}{4}$-$1\frac{1}{2}$ broad, petioles 2-4 lines long, flowers whitish rusty pubescent axillary or from the old axils generally in clusters of 3-4 together, pedicels about as long as the petiole, calyx segments 5 ovate acute equal or the exterior 3 broader, corol nearly twice as long as the calyx, lobes erect ovate acute, tube externally pilose, anthers apiculate, the filaments hairy, the alternate scales ovate to linear-lanceolate finely subulate as long as the stamens, the back and margin pilose.—Sapota elengioides, *DC. Prod.* 8, 176.

A very common tree on the higher ranges of the Nilgiris and other mountains on the west of this Presidency, is to be found in every wood about Ootacamund in flower and fruit at all seasons, it is also found at lower elevations and it inhabits Ceylon ; the fruit is like a small crab apple and is made into pickles, and the natives cook and eat it in curries; the wood is esteemed, it is of a dull red color, short but straight in the grain and very dense, it makes good beams for houses, but splits too much to be used for planks ; if well seasoned it turns well and it makes excellent carpenter's planes, The Burghers on the Nilgiris call the tree Holay, and the Tamil people call it Pálá.

Analysis.

1. A flower bud.
2. A full flower.
3. The same, corol removed.
4. The 5-lobed corol, showing the 5 extrorse anthers alternate with 5 linear scales.
5. A petal.
6. The scales, front and back view.
7. Portion of a corol, showing ovate scales.
8. Anthers, front and back view.
9. A flower, corol removed and the calyx opened, to show the ovary.
10. The same cut vertically, showing the ovules attached to the centre of the axis.
11. Ovary cut transversely, showing 5 cells.
12. Fruit cut transversely, showing 1 seed, 5 having aborted.
13. A seed.
14. The same cut transversely.
15. Embryo.



Govindo del; Dunphy Lith:

Achras elengioides. (D.C.)

CHRYSOPHYLLUM ROXBURGHII. (Nat. order Sapotaceæ.)

CHRYSOPHYLLUM. *Linn.*—GEN. CHAR. Calyx segments, corol lobes, stamens and cells of the ovary 5 each (or rarely 6-8), no staminodia nor any scales to the corol, seed usually 1 or few, testa hard and smooth, hilum lateral reaching at least half-way up, albumen scanty or none, cotyledons thick and fleshy. Trees or shrubs, leaves usually rusty or silvery-tomentose underneath, flowers small clustered.

CHRYSOPHYLLUM ROXBURGHII. (G. Don.) A good sized tree with numerous slender smooth round branchlets, young shoots and young leaves covered with dense golden tomentum, leaves alternate coriaceous lanceolate to oblong entire gradually acuminate or abruptly rostrato-acuminate, polished on both sides, 3-7 inches long by 1-2 broad, veins very straight simple close and parallel joined near the margin by a continuous waved vein, petioles 3 lines long, peduncles axillary or from nodes at the old axils in clusters 2-15 together, about 4 lines long, 1-flowered, flowers minute pale yellow, calycine segments 5 oval unequal imbricate, corol tube as long as the calyx, lobes oval ciliate imbricate, the 5 filaments inserted on to the tube near its base, ovary ovate very hairy 5-celled with 1 ovule in each cell attached to the centre of the axis or sometimes erect from near the base, fruit spherical or obscurely 5-angled, 1-1¼ inches in diameter, when ripe smooth and yellow 5-celled filled with much pulp, seeds shining brown 8 lines long by 4 broad. *G. Don.*;—*DC. Prod.* viii. 162. C. acuminatum, *Roxb. Fl. Ind.* 1. *p.* 599.

This tree is rather common on our western mountains up to about 3000 *feet elevation, and in Ceylon, and is also found in Bengal and Bombay; the fruit is eaten but is insipid, and the pulp is very sticky; the wood is used for building purposes. The tree is called Hali in Canarese and Lawooloo in Ceylon.*

Analysis.

1. A flower bud, showing the imbricate sepals.
2. A full flower, showing the monopetalous corol with its lobes imbricate.
3. The corol opened out, showing the 5 stamens inserted on to its tube near the base.
4. Anthers, front and back view.
5. The hairy ovary.
6. Ovary cut transversely, showing its 5 cells.
7. Ovary cut vertically, showing the ovules attached to the centre of the axis.
8. The same, showing the ovules erect from near the base of the axis.

Gouvindo, del. Dumphy, Lith:

Chrysophyllum Roxburghii. (G. Don.)

SYMPLOCOS GARDNERIANA. (Nat. order Styraceæ.)

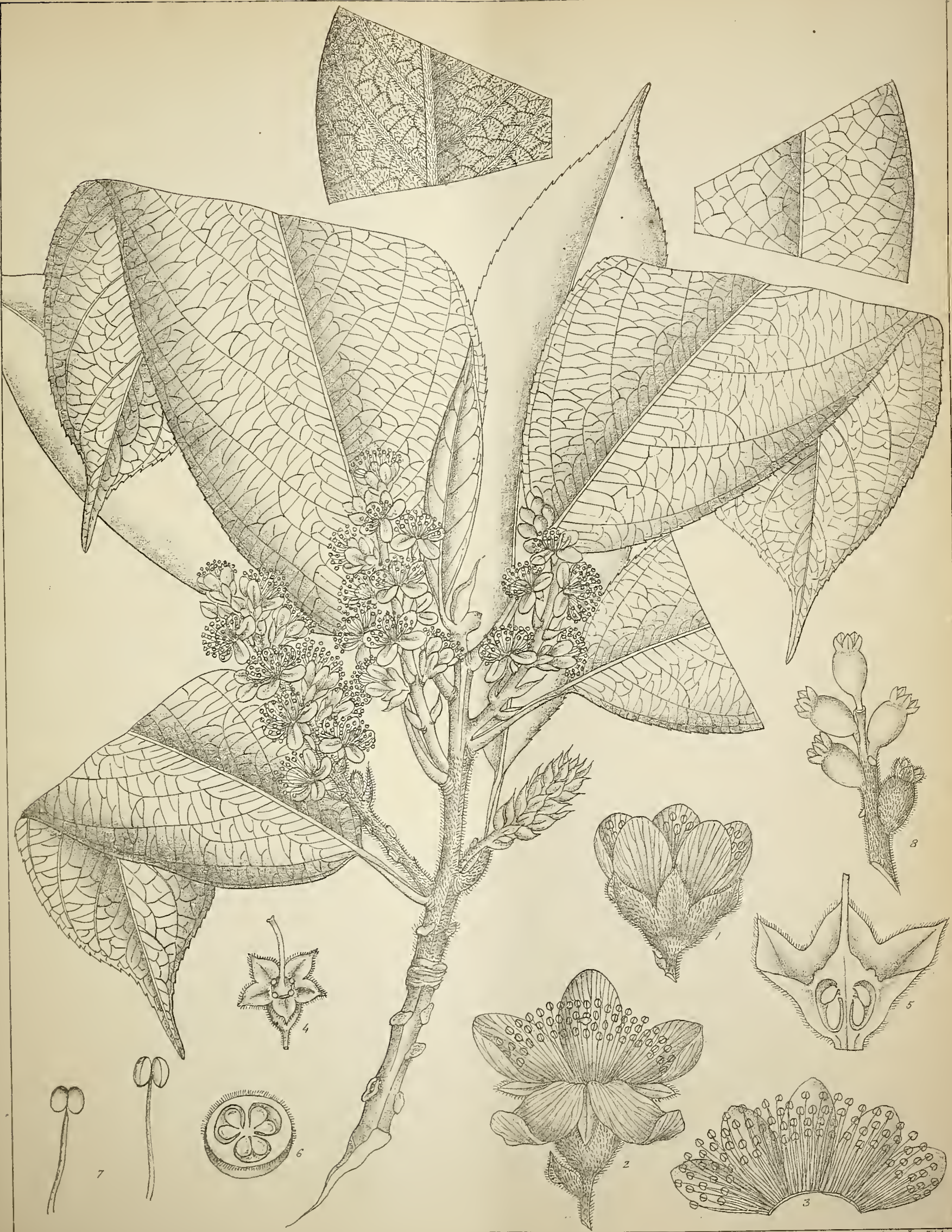
SYMPLOCOS. *Linn.*—GEN. CHAR. Calyx 5 lobed, corol lobes imbricate in the bud and not contorted, the petals sometimes almost free, stamens generally very numerous always more than twice as many as corol-lobes, filaments filiform, ovary 2-5 celled with 2 or rarely 3 ovules in each cell, fruit a berry crowned with the calyx-lobes, usually with only 1 or 2 seeds, cotyledons much shorter than the radicle. Trees or shrubs, the foliage often turning yellow in drying, flowers in axillary simple or branched spikes or racemes.

SYMPLOCOS GARDNERIANA. (Wight.) A large tree, young branches densely ferrugineo-tomentose, leaves elliptic acute or with a longish acumination, minutely denticulate at the margin or subentire, glabrous above, softly pubescent beneath with very prominent costa and primary pinnate veins densely tomentose, 4-7 inches long by 2-3 inches broad, petioles densely ferrugineo-tomentose 10-12 lines long, racemes axillary much shorter than the leaves tomentose, flowers crowded, bracts, bracteoles and calyx tomentose on the outside, stigma large capitate. *Wight Icones* 1231.

This is a very beautiful tree when in flower, and decidedly the finest of our numerous species of the genus; the specimen figured was gathered on the Anamallays (6000 *feet elevation), and I also have specimens from different parts of the Travancore and Tinnevelly mountains and elevations as low as* 4500 *feet. Dr. Wight found it on the Nilgiris ; the leaves turn yellow in drying, and they yield a dye ; the timber is not esteemed, and is said to decay very rapidly.*

Analysis.

1, 2. Flower.
3. Corol removed, showing the 5 lobes slightly joined at the base and the very numerous unequal stamens in several rows attached to its base.
4. Calyx and style.
5. Ovary cut vertically, showing the pendulous ovules 2 in each cell.
6. Ovary cut transversely, showing that it is 3 celled.
7. Anthers.
8. Young fruit.



Govindo del.

Dumphy Lith:

Symplocos Gardneriana, Wight

OLEA GLANDULIFERA. (Nat. order Jasmineæ.)

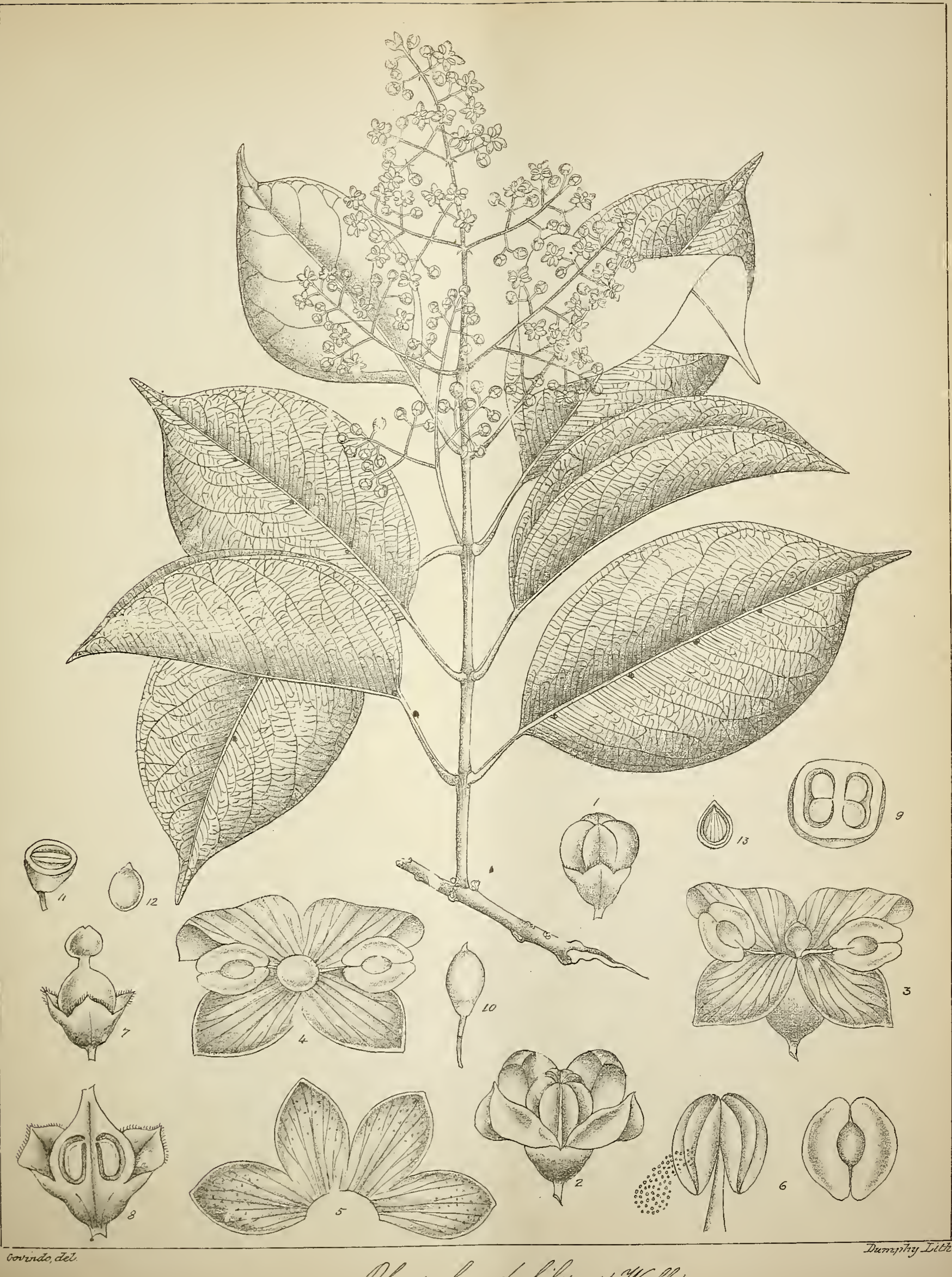
OLEA. *Linn.*—GEN. CHAR. Calyx short 4-toothed, corol with a short tube and 4 lobes, slightly imbricate or valvate in the bud (rarely wanting), ovules 2 in each cell of the ovary pendulous, style short, fruit a drupe the endocarp usually hard, seed solitary or rarely 2, albumen copious fleshy. Trees or rarely shrubs, leaves opposite entire, flowers small in axillary panicles or clusters, rarely also terminal.

OLEA GLANDULIFERA. (Wall.) A very large tree, leaves entire glabrous oval, ovate, or elliptic, terminating in rather a sudden acumination at the apex, rounded or more or less attenuated at the base, furnished with hollow hairy glands in the axils of the veins beneath, 4-5 inches long by 2-2¼ inches broad, petiole 6-10 lines long, panicles axillary and terminal shorter than the leaves, glabrous, calyx ciliate, corol glandular very deeply 4-cleft leaving a very short tube, ovary glabrous, stigma large capitate papillose, fruit about ½ an inch long.

This tree is abundant on the northern slopes of the Nilgiris (Ouchterlony's valley), elevation 4-5000 *feet, and I also have it from the Anamallays, and it is found in Nepal. As far as I have observed this species, it is a very large tree and by far the largest of the genus; but Dr. Wight found it in woods about the Avalanche as a small tree; this was probably owing to the elevation* (6000 *feet.*)

Analysis.

1. A flower bud.
2. A flower opening.
3. A full flower.
4. The corol and stamens removed.
5. The corol, showing that it is monopetalous with a very short tube.
6. Anthers.
7. Ovary, style and stigma.
8. Ovary cut vertically, showing the pendulous ovules.
9. Ovary cut transversely, showing the 2 cells.
10. A fruit.
11. The same cut vertically.
12. The seed.
13. The same cut vertically, showing the embryo lying in albumen.



Govindo, del. Dunphy Lith.

Olea glandulifera. (Wall.)

CHIONANTHUS INTERMEDIA. (Nat. order Jasmineæ.)

CHIONANTHUS. *Linn.*—GEN. CHAR. Calyx small 4-lobed, corol of 4 narrow small or elongated petals quits distinct or slightly connected at the base induplicate-valvate in the bud, anthers extrorse, ovules 2 in each cell of the ovary attached to the centre of the axis, style short, fruit a drupe, seeds usually solitary without albumen, cotyledons thick and fleshy sometimes slightly ruminate. Trees or shrubs, leaves opposite entire, flowers in axillary panicles rarely reduced to sessile clusters.—Linociera, *Swartz.*

CHIONANTHUS INTERMEDIA. (Wight.) A large tree, perfectly glabrous, leaves lanceolate gradually acuminated at both ends and terminating in rather a fine point at the apex, deep shining green, 5-6 inches long by $1\frac{1}{2}$-$2\frac{1}{2}$ inches broad, petioles about 1 inch long, panicles axillary about two-thirds the length of the leaves, bracteated at the ramifications, flowers on short pedicels glabrous in all their parts 3-5 together on the ends of the ramuli, occasionally male by abortion, petals 4 all slightly cohering though easily separabls at the base, stigma 2 lobed, ovules attached to the centre of the axis, fruit oblong pointed $1\frac{1}{2}$ inches long by 10 lines broad. —Linociera intermedia, *Wight Icones tab.* 1245.

The specimen here figured was collected on the Anamallays (banks of the Toracadu) 5000 *feet elevation, and was a large handsome tree. I have specimens from the Conoor ghat, Nilgiris, where Wight collected the typical specimens, and they differ in no way except in the size of the fruit; the timber is esteemed by the natives.*

Analysis.

1. A flower bud.
2. A full flower, the petals induplicately valvate.
3. The same petals removed, showing the ovary and 2-lobed stigma.
4. Corol removed, the 4 petals distinct and easily separable but adnate to each other at the base.
5. A pair of petals joined by the anther; on removing the latter they separate.
6. A single petal, showing its inflexed margins.
7. Anthers, front and back visw.
8. Ovary cut vertically, showing the ovules attached to the centre of ths axis. [In our 3 species of Chionanthus, the ovules are attached to the centre of the axis, or suberect from slightly below ths centre; in all our species of Olea that I have dissected the ovules are pendulous from near the apex.]
9. Ovary cut transversely, showing ths 2 cells each with 2 ovules.
10. Ripe fruit, natural size.

Dumphy Lith:

Chionanthus intermedia (Wight.)

NYCTANTHES ARBOR-TRISTIS. (Nat. order Jasmineæ.)

NYCTANTHES. *Juss.*—GEN. CHAR. Calyx tubular entire or obsoletely 5-6 crenated, corol-tube terete, limb 5-8 lobed, lobes obcordate contorted in æstivation, anthers 2, sessile on the corol just within the tube, stigma capitate glandular, capsule obovate or rounded compressed chartaceous, 2-celled, 2-valved, opening transversely from the apex, seed solitary in each cell erect from the base exalbuminous, cotyledons orbicular, radicle inferior. A small tree, leaves opposite simple, peduncles axillary and terminal few flowered, flowers fragrant.—Scabrita, *Linn.* Parilium, *Gærtn.*

NYCTANTHES ARBOR-TRISTIS. (Linn.) A small tree, trunk erect, bark scabrous, branches numerous spreading, the young ones 4-sided, leaves opposite ovate or oblong to cordate acuminate entire or serrate, very scabrous, 3-5 nerved at the base, 3-5 inches long by 1-3 inches broad, petioles 2-5 lines long, peduncles axillary and terminal leafy furnished with several few-flowered umbellets, flowers exquisitely fragrant, the tube orange colored and the limb white, opening at sunset and falling off at sun rise, involucre to the umbellets 2-6 leaved. *Roxb. Fl. Ind.* 1. 86.

This charming little tree is very abundant in the jungles about Jubbulpore and Central provinces, Godavery jungles, &c., but I never saw it wild in the south of this Presidency ; it is however to be met with cultivated in almost every native garden, and about temples ; the flowers have a most delicious smell; somewhat like honey, the orange tubes of the flowers dye a fine buff or orange color. The tree is called Bàrjàt in Hindoostanee and Kirsàru by the Gonds in the Godavery forests, and Sepala in Ceylon ; it yields a hard useful wood, but of small size. Its Sanscrit name is Sephalica, and it is often mentioned by the Sanscrit poets.

Analysis.

1. A flower.
2. Calyx, ovary and style.
3. Corol opened out, showing the 2 stamens sessile within the tube, and 6 obcordate lobes (there are sometimes 5-8.)
4. One of the lobes of the corol.
5. Ovary cut vertically, showing the erect solitary ovules.
6. The same cut transversely, showing the 2 cells.
7. A fruit.
8. The same cut vertically, showing the solitary erect seed, no albumen.
9. Seed cut vertically, showing the embryo,
10. The embryo with orbicular cotyledons and inferior radicle.

Nyctanthes arbor-tristis, (Linn.)

WRIGHTEA TINCTORIA. (Nat. order Apocyneæ.)

WRIGHTEA. *Br.*—GEN. CHAR. Calyx 5-lobed, with 5 to 10 scales inside at the base, corol-tube cylindrical usually short, lobes spreading contorted in the bud furnished at their base or below the middle with a corona of variously shaped erect scales either distinct or united in a ring. Stamens inserted in the throat, filaments very short and broad, anthers sagittate exserted united or connivent in a cone round the stigma, no hypogynous disk or scales, ovary of 2 carpels distinct or connate, but readily separable, ovules numerous, fruit long terete at length separating into 2 follicles, seeds oblong with a tuft of hairs at the end furthest from the hilum. Trees or shrubs, often with milky juice, leaves opposite, flowers in terminal corymbose cymes appearing sometimes axillary after the development of one branch only of the fork, bracts small.—Balfouria, *R. Br.*

WRIGHTEA TINCTORIA. (Br.) A small tree abounding with milky juice, leaves membranaceous perfectly glabrous or occasionally more or less pubescent elliptical-lanceolate with rather a blunt often long acumination, quite entire or with the margin slightly erose, 3-10 inches long by 1-4 broad, petioles 2-3 lines long, cymes glabrous or slightly pubescent, bracts linear-lanceolate caducous, flowers pure white fragrant, 1-1½ inch across, calyx-lobes ⅔ as long as tube of corol, oblong obtuse pubescent on the outside and ciliate and furnished inside at the base with 5-10 glabrous narrow linear scales which are ⅔ as long as the calyx, corol pubescent, lobes obtuse, scales of the corona very numerous and of various lengths, some inserted with the filaments near the apex of the corol tube, others collected in phalanges on the lobes of the corol and nearly equalling the anthers in length, all generally glabrous and thickened towards the apex, anthers hairy at the apex and on the inside and generally slightly so on the back, stigma glutinous cap-like and toothed at the contracted apex, follicles pendulous slender about 5 lines in diameter, 10-20 inches long, at first adhering at the apex.—Wrightea tinctoria et Rothii, *DC. Prod.* viii. 406;—*Wight Icones tab.* 1319. Nerium tinctorium, *Roxb. Fl. Ind.* ii. *p.* 4.

This pretty little tree is most abundant in the jungles in every part of this Presidency, and ascends the mountains to nearly 4000 *feet elevation. The wood is beautifully white like ivory and close-grained, and cuts like soap on the lathe. An indigo is extracted from the leaves; the tree is called in Telugu Tedlapàl and in Tamil Pàlà, the glabrous variety is more common than the variety with puberulous leaves.*

Analysis.

1. A flower bud showing the calyx about ⅔ as long as tube of corol, and corol lobes contorted in æstivation.
2. A full flower, showing the anthers united in a cone round the stigma.
3. Calyx, ovary and cap-like stigma, the calyx with 10 glabrous scales.
4. One of the scales from the inside of the calyx.
5. Corol opened to show stamens and corona.
6. A lobe of the corol, showing scales of the corona.
7. Corona scales.
8. Anther, inside view.
9. Anther, outside view.
10. Ovary cut vertically.
11. The same cut transversely.
12. Portion of a follicle opened, to show the seeds.
13. A seed.
14. The same, testa removed.
15. The seed, transverse section, showing much folded cotyledons.

Vorinde del. Dumphy Lith.

Wrightea tinctoria, R.Br.

ALSTONIA SCHOLARIS. (Nat. order Apocyneæ.)

ALSTONIA. *R. Br.*—GEN. CHAR. Calyx without any or with very minute glands. Corolla-tube cylindrical, more or less swollen round the anthers, the lobes spreading, contorted in the bud, throat without scales. Anthers enclosed in the tube. No hypogynous scales. Ovary of 2 distinct carpels united by the style, stigma ovoid or conical; ovules numerous, in about 4 rows in each carpel. Fruit of 2 loug linear follicles. Seeds oblong, compressed, peltately attached, bordered with hairs of which those at each end are usually very long; albumen scanty. Trees or tall shrubs with a milky juice. Leaves in whorls of 3 or more, or in a few species opposite. Flowers in terminal corymbose cymes, usually 1 in the axil of each leaf of the terminal whorl. Bracts small.—Blaberopus, *A. DC.*

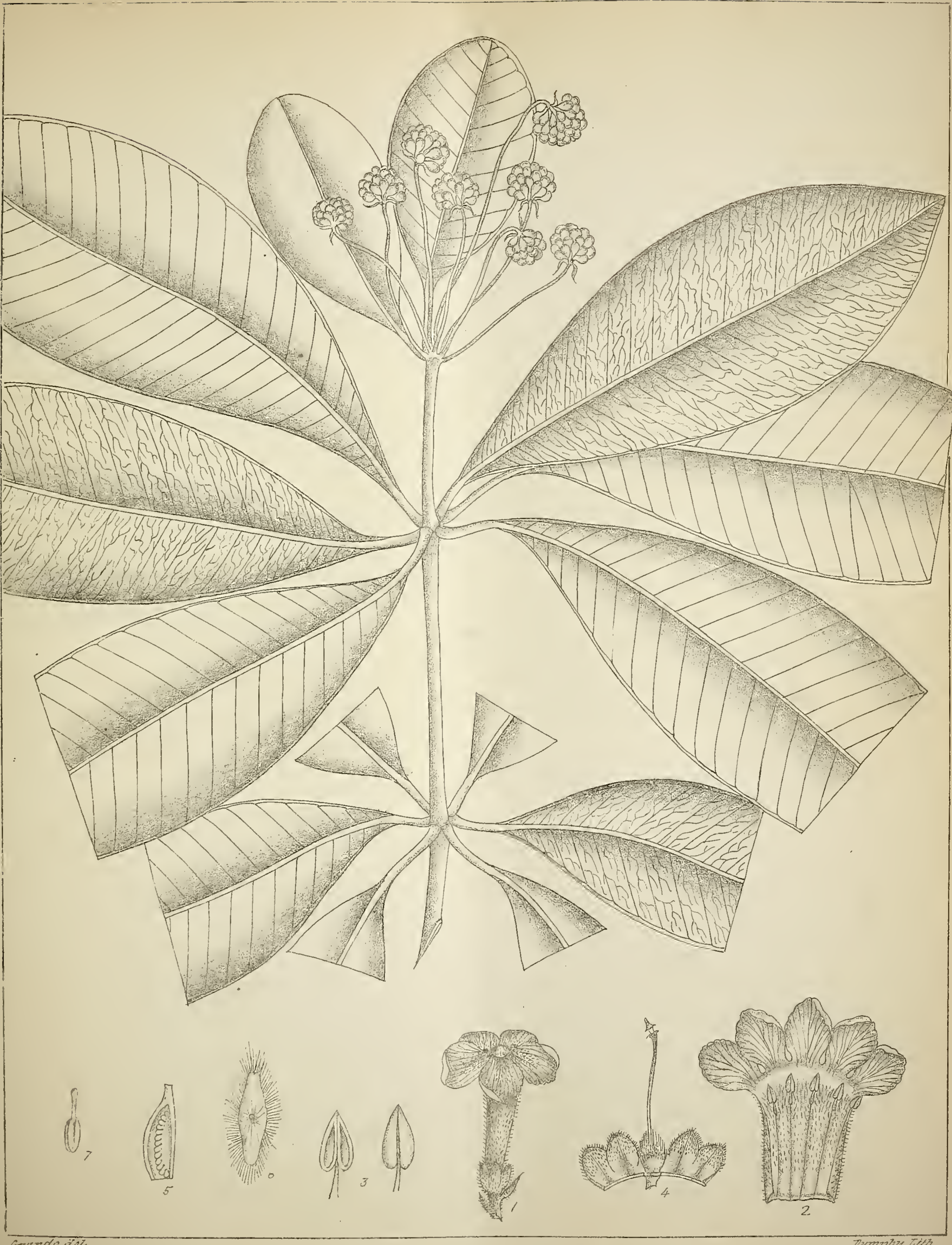
ALSTONIA SCHOLARIS. (R. Br.) A tree attaining 80 to 90 feet, usually glabrous except the minutely pubescent inflorescence. Leaves in whorls of 5 to 7, broadly petiolate, obovate oblong, very obtuse, shortly contracted at the base, coriaceous, with transverse parallel veins, smooth and shining above, opaque and pale or whitish underneath, 4 to 6 inches long. Peduncles in the axils of the terminal whorls shorter than the leaves, each bearing 1 or 2 whorls of secondary peduncles, and each of these a dense cyme of nearly sessile flowers. Calyx segments ovate, pubescent, rather above 1 line long. Corolla tube 3 to 4 lines long, lobes pubescent outside, much shorter than the tube, the left hand edges overlapping in the bud, the throat closed by a dense ring of hairs. Ovary hirsute at the top. Follicles 1 foot long or even more. Seeds about 3 lines long, the hairs at each end longer than the seed itself. *Benth. Fl. Aust.* iv. *p.* 312;—*DC. Prod.* viii. 408;—*Wight. Ic. tab.* 422.

This tree is very common in the plains on the western side of this Presidency and in Mysore up to an elevation of about 3000 *feet, and in Ceylon, and it is also found in Africa and Australia; it is very generally known by the native name Pàlà (which signifies milk), but several other trees are also known by the same name, and another Tamil name for it is Wodrase. In Ceylon it is called Rookattana, and the wood is there generally employed for making coffins; on the Bombay ghats it is called Satween; the bark possesses powerful tonic properties, and is a common native medicine in bowel complaints. The wood, which is very bitter, is white and light and is used for making packing cases, sheaths and turnery purposes.*

Analysis.

(The plate represents a branch in bud only.)

1. A full flower.
2. Corol removed and opened to show insertion of the anthers.
3. Anthers, front and back view.
4. Calyx, ovary, style and stigma.
5. Vertical section of one of the carpels.
6. A seed.
7. Embryo.



Govindo del.

Dumphy Lith

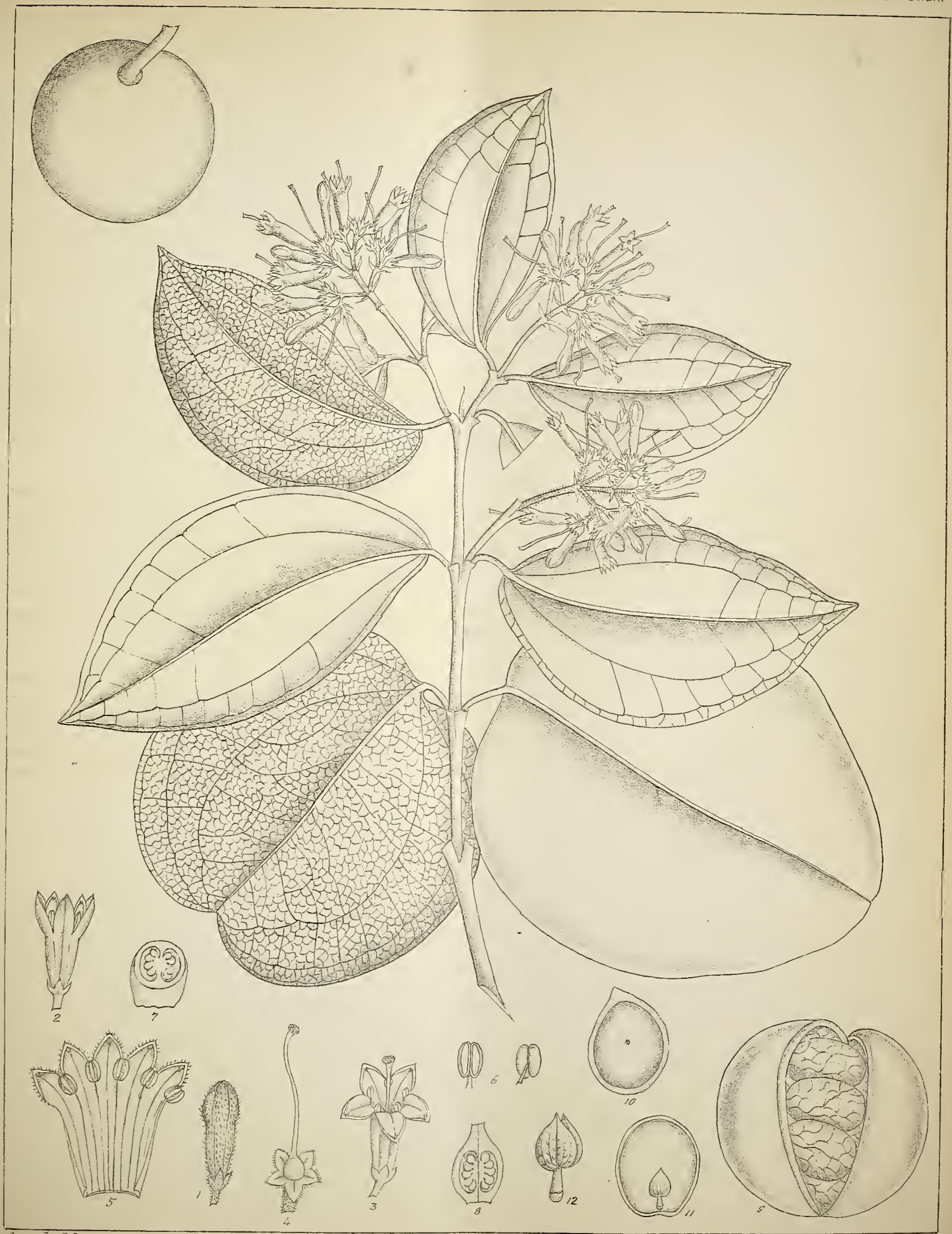
Alstonia scholaris. R. Br.

STRYCHNOS NUX-VOMICA. (Nat. order Loganiaceæ.)

STRYCHNOS. *Linn.*—GEN. CHAR. Calyx 4-or 5-lobed. Corolla with a short or cylindrical tube and 4 or 5 spreading lobes, valvate in the bud. Stamens 5, inserted in the tube, the anthers usually exserted. Ovary 2-celled, with several ovules in each cell. Style simple, with a capitate or obscurely 2-lobed stigma. Fruit a globular indehiscent berry, with the rind usually hard. Seeds imbedded in pulp, more or less compressed, and often reduced to one or two in each fruit. Shrubs, trees or woody climbers. Leaves opposite, 3-nerved or 5-nerved at the base, with transverse reticulate veinlets, often smooth and shining. In the climbing species there are usually spirally recurved hooks in one of the axils, in which case the subtending leaf is usually reduced to a small bract, whilst the opposite leaf remains normal. Flowers in axillary or terminal cymes, clusters or panicles. *Benth. Fl. Aust.* iv. *p.* 368.

STRYCHNOS NUX-VOMICA. (Willd.) A middling sized tree, glabrous except the minutely pubescent inflorescence, leaves ovate often obliquely so to oval or nearly quite orbicular, acute at the apex or quite rounded, thinly coriaceous shining above not glaucous beneath, 3 to 5 nerved, 3-4 inches long by 2 to 3¼ broad, petioles 3-6 lines long, cymes corymbose trichotomous shortly pedunculate above the last pair of leaves minutely pubescent. Flowers greenish-white, calyx about ½ a line long puberulous, corol-tube cylindrical about 5 lines long very slightly puberulous or glabrous, lobes 5 short, anthers on short filaments in the throat. Ovary glabrous with numerous ovules in each cell, style as long or longer than the corol tube, stigma peltate. Fruit globular with a hard shell 1½-2¼ inches in diameter, bright orange colored, seeds about 6 in greenish-white pulp flat orbicular about 9 lines in diameter, testa greyish white smooth and satiny, albumen cartilaginous, cotyledons broad-ovate 3-4 lines long, radicle thick and nearly as long as the cotyledons. *Roxb. Fl. Ind.* i. *p.* 575.

This tree is most common throughout this Presidency and in many other parts of India and in Ceylon, it ascends the mountains to about 4000 *feet elevation ; it is called Kuchlà in Hindostanee, Mushti in Teligu, and Yetti in Tamil, and is known to Europeans as the Nux vomica tree ; in Ceylon it is called Goda-kaduru, and Kàjrà in the Bombay Presidency; the wood is very bitter, of a light-brown color streaked with white, and is impervious to the attack of white-ants'; a cubic foot unseasoned weighs about* 70 *lbs and when seasoned* 56 *lbs, its specific gravity is* ·896, *it is hard, durable and stiff, and is used in the construction of carts, house building, ploughs, cabinet purposes, &c. ; the seed is the Nux vomica of commerce, which yields strychnine, but the pulp of the fruit is quite harmless and the favorite fruit of many birds, the root is used medicinally by the natives as a febrifuge.*



Govindo, del.

Dronphy, Lith.

Strychnos nux-vomica (Willd:)

FAGRÆA COROMANDELINA. (Nat. order Loganiaceæ.)

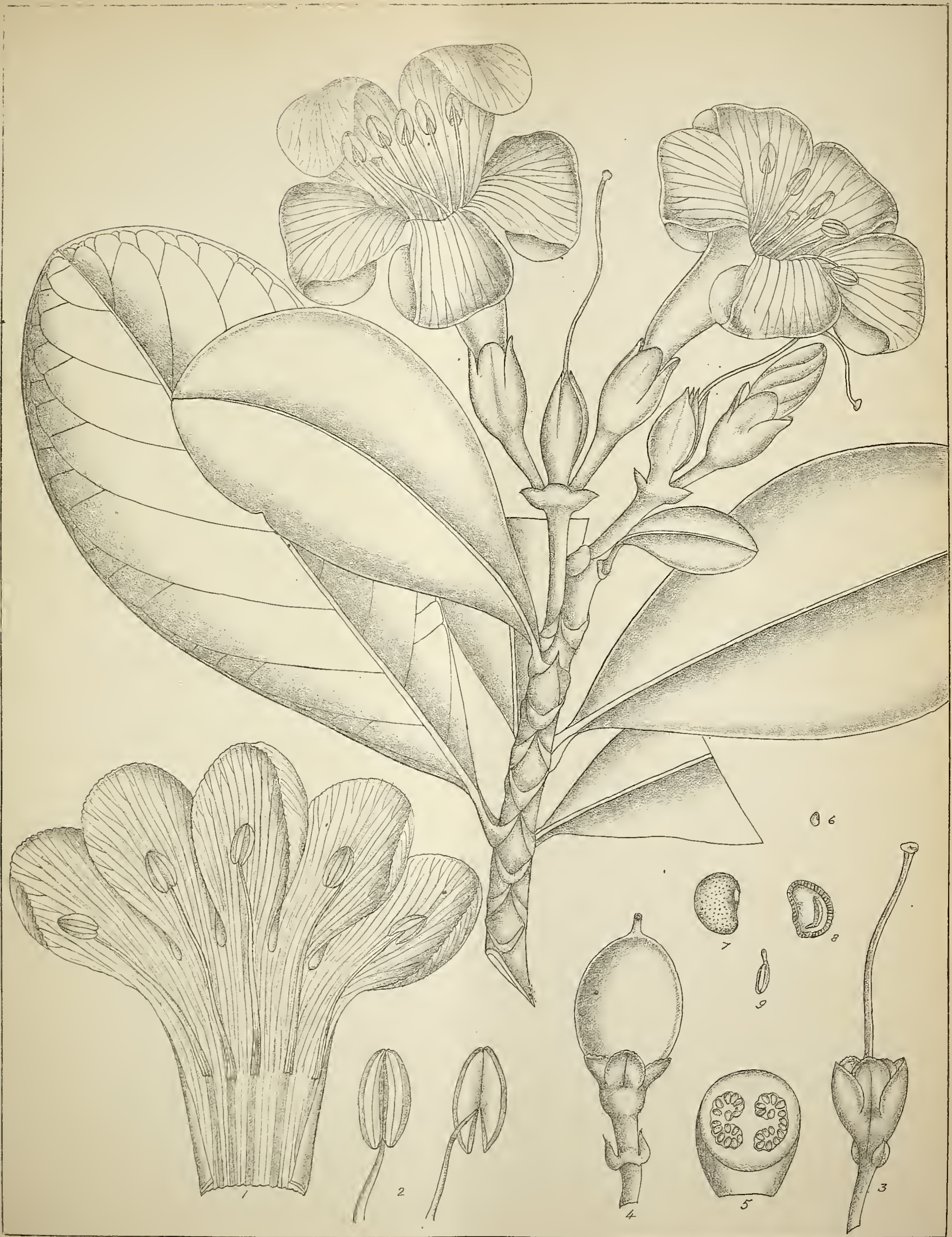
FAGRÆA. *Thunb.*—GEN. CHAR. Calyx 5-cleft, segments imbricate, corol-tube usually expanding at the top into a campanulate throat, the limb spreading often oblique, lobes 5 rather unequal imbricate in the bud. Stamens 5 usually shortly exserted, ovary more or less completely 2 or rarely 3-celled, the placentas often not meeting in the centre at least at an early stage, ovules several to each cell or placenta, style single with a peltate stigma, fruit succulent indehiscent, seed immersed iu pulp, albumen copious, embryo very small. Trees or shrubs, leaves thick coriaceous, flowers large showy in terminal raceme-like or corymbose panicles, rarely reduced to a single flower, bracts small with 2 bracteoles under the calyx.

FAGRÆA COROMANDELINA. (Wight.) A small tree quite glabrous, leaves succulent thick spathulato-oblong rounded or retuse at the apex, 4-6 inches long by 2-3 broad, petioles winged 3-4 lines long, stipules interfoliaceous closely embracing the stem, peduncles terminal usually 3 from the end of the branch each with 3 flowers, flowers white, calyx with 2 small bracteoles below its base, lobes rounded, corol 3-3½ inches long infundibuliform, lobes rounded 1½ inch long revolute entire or slightly crenulate at the margins, anthers oblong deeply lobed at the base with the filament attached between the lobes, filaments adnate to the centre of the tube of the corol, style exserted, stigma large peltate, fruit oval shining and very smooth about 1½ inch long pointed with the persistent base of the style, 2-celled, filled with fleshy pulp in which the numerous small seeds lie, seeds subreniform with a pit at the hilum, testa scrobiculate, albumen copious, embryo terete, radicle superior. *Wight Icones tab.* 1316.

A small tree with very large showy flowers, common throughout the western forests of this Presidency from scarcely any elevation up to nearly 6000 *feet. I am not aware of any use that the tree is put to, but it is well worth cultivating for ornament. The species is probably identical with F. obovata of Wallich, or at least only a variety of it.*

Analysis.

1. A flower opened, showing the insertion of the stameus.
2. Anthers, front and back view.
3. Calyx showing the 2 bracteoles, style and stigma.
4. Nearly ripe fruit.
5. Transverse section of the same, showing the 2 cells and very uumerous seeds.
6. A seed (uatural size.)
7. A seed magnified.
8. Vertical section of the same.
9. Embryo.



Govindo. del. Dumphy Lith.

Fagræa Coromandelina. (Wight.)

CORDIA WALLICHII. (Nat. order Boragineæ.)

CORDIA. *Linn.*—GEN. CHAR. Calyx tubular or campanulate, 5 toothed or irregularly toothed or lobed. Corolla-tube cylindrical or funnel-shaped, the limb 5 or sometimes 6 or more-lobed. Stamens inserted in the tube, anthers included or exserted. Ovary entire, 4 celled, with 1 pendulous or laterally attached ovule in each cell; style terminal, twice forked. Fruit a drupe, the endocarp hard, with 4 cells or fewer by abortion. Seeds without albumen; testa thin; cotyledons longitudinally folded; radicle superior. Trees or shrubs, glabrous scabrous-pubescent or villous. Leaves entire or toothed. Flowers in cymes, sometimes contracted into heads, at first terminal, but often becoming lateral by the growth of the branch. Bracts small or none.

CORDIA WALLICHII. (G. Don.) A good sized tree, leaves from broad-ovate or orbicular to cordate often more or less repand, rounded or slightly pointed at the apex, 4-5 inches each way, glabrous or subglabrous above (the veins sometimes slightly hairy) densely woolly beneath, 3-5 nerved at the base, petioles 1-1½ inches long, flowers polygamous about 6 lines in expansion in loose pedunculate terminal cymes or panicles, calyx ovate 5-toothed densely albo-villous towards the apex, closed over the corol in the bud, hardened cup-shaped and irregularly toothed in fruit. Corol 5-lobed, lobes revolute, tube hairy within, anthers much exserted oblong sagittate at the base, style twice forked as in the genus, ovules attached to the centre of the axis, drupe ovoid or globular the pulp viscid. *G. Don Gen. Syst.* 4 *p.* 379. C. tomentosa, *Wall. in Roxb. Fl. Ind.* (*ed. Wall.*) *vol.* 11, *p.* 339.

This tree is tolerably common throughout our western forests and in Mysore and the Bombay Presidency; technically it is hardly distinct from the common Cordia myxa, but the densely woolly leaves well distingush it. The timber is serviceable and in use with the natives.

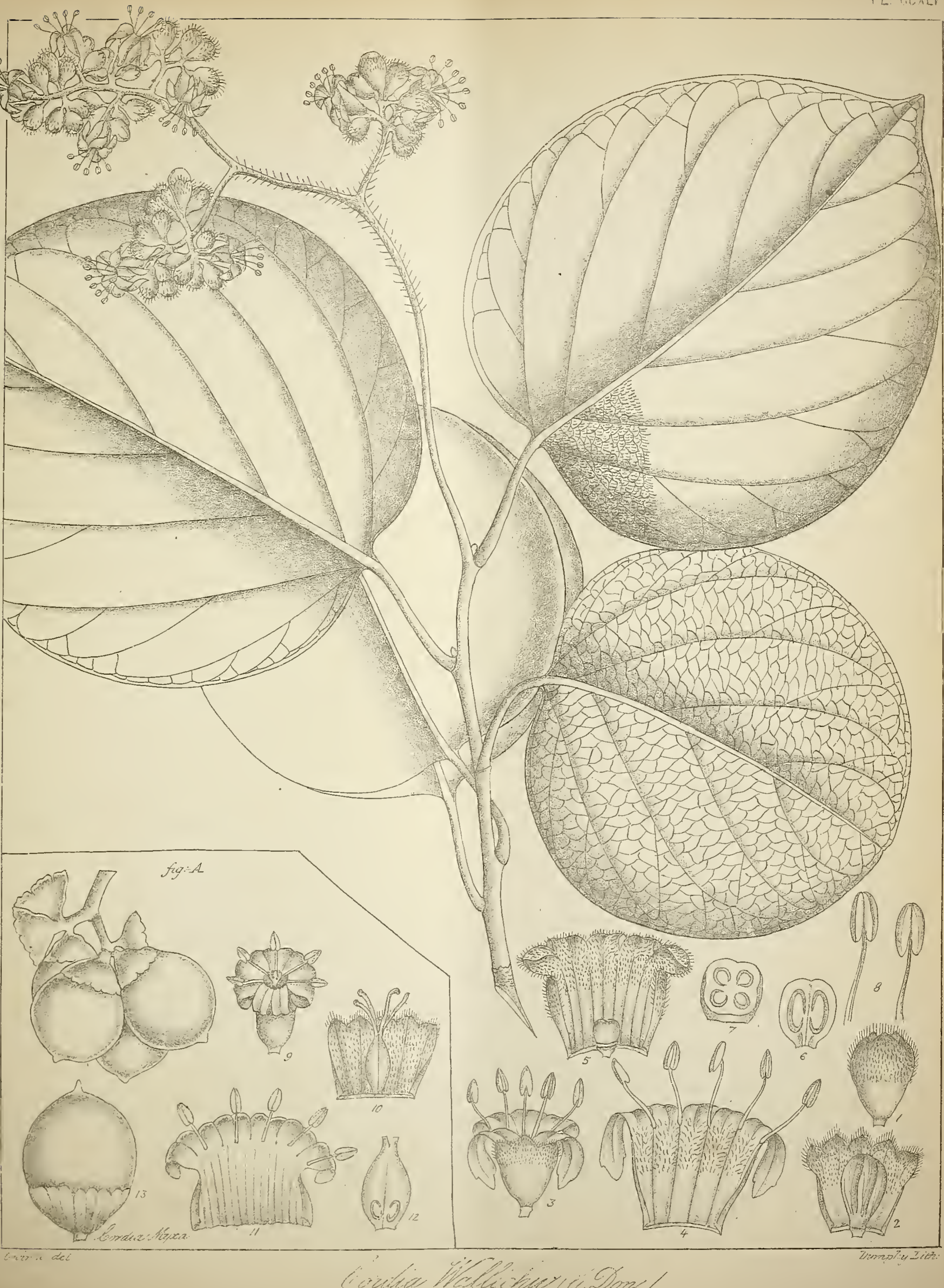
Analysis.

1. A flower bud, calyx slightly 5-lobed densely albo-villous towards the apex.
2. The same open, showing the young corolla.
3. A full flower, male.
4. Corol of the same opened to show insertion of the stamens, the tube hairy inside on its upper half.
5. Calyx and abortive ovary of the male flower.
6. Abortive ovary cut vertically, showing the ovules attached to the centre of the axis (they are imperfect and do not ripen.)
7. The same cut transversely, showing 4 cells.

Figure A.—CORDIA MYXA.

8. Hermathrodite or fertile flower.
9. Calyx, ovary, style and stigmas.
10. Corol opened.
11. Ovary cut vertically, showing the ovules attached to centre of axis.
12. Fruit, showing the irregularly toothed cup-like hardened calyx.

N. B.—The tree of C. Wallichii from which the drawing and analysis were taken, had only male flowers, so I have given the analysis of a fertile flower from a tree of C. myxa.



Gorr. del. Dumphy Lith.

Cordia Wallichii (G. Don)

EHRETIA LÆVIS. (Nat. order Boragineæ.)

EHRETIA. *Linn.*—GEN. CHAR. Calyx deeply divided into 5 segments. Corolla with a short or cylindrical tube, limb of 5 spreading lobes, imbricate in the bud. Stamens inserted in the tube; anthers exserted or rarely almost included. Ovary 2-celled with 2 ovules in each cell, or 4-celled with 1 ovule in each cell; style terminal, more or less 2-lobed or forked, the lobes entire, without any prominent ring. Fruit a drupe, the endocarp forming 2 two-seeded or 4 one-seeded pyrenes. Seeds with a membranous testa and usually scanty albumen; cotyledons ovate, not folded. Trees or shrubs, often glabrous. Leaves entire or toothed. Flowers rather small, usually white, in panicles or cymes, either terminal in the upper axils or rarely all axillary. Bracts small. Fruit usually much smaller than in Cordia.

EHRETIA LÆVIS. (Roxb.) A small or middling sized tree quite glabrous, leaves ovate oval or elliptical acutely acuminate or rather obtuse quite entire rounded or tapering at the base shining above, 3-5 inches long by about 2 broad. Flowers small in axillary shortly pedunculate dichotomous cymes much shorter than the leaves. Calyx-segments narrow under one line long, corol-tube about as long as the calyx, the lobes twice as long spreading, anthers exserted, ovary 4-celled with 1 ovule in each cell, style 2-forked at the apex, drupe small containing 4 one-seeded pyrenes. *DC. Prod.* ix. 505;—*Wight Ic. tab.* 1382;—*Benth. Fl. Aust.* iv. *p.* 389.

This tree is common throughout the jungles of this Presidency and in Ceylon; its timber is strong, hard and durable, and is in use for various purposes with the natives. In the Godavery forests the tree is called Paldàtam (Teligu), and in the Circars, Peda pul-mera (Teligu.)

Analysis.

1. A flower bud, showing corol lobes imbricate.
2. A full flower.
3. Corol removed and opened to show insertion of the stamens.
4. Anther, front and back view.
5. Calyx, ovary and style.
6. Ovary cut transversely, showing its 4 cells.
7. Ovary cut vertically, showing the pendulous ovules.

Gouindo del. Dunphy. Lith.

Ehretia laevis.! Roxb.;

SALVADORA WIGHTIANA. (Nat. order Salvadoraceæ.)

SALVADORA. *Linn.*—GEN. CHAR. Calyx small 4-parted, segments not imbricate, corol gamopetalous with a very short tube, limb 4-lobed, lobes imbricate, stamens 4 inserted at the base of the corol tube, the filaments slightly connected at the base, anthers introrse 2-celled subglobose dehiscing longitudinally, ovary free 1-celled, ovule solitary erect from the base anatropous, stigma sessile undivided or sub 4-lobed, berry succulent globose 1 seeded, seed erect, embryo exalbuminous, cotyledons fleshy plano-convex, radicle inferior included. Glabrous trees, leaves opposite simple petioled entire coriaceous, flowers small in lax panicles.

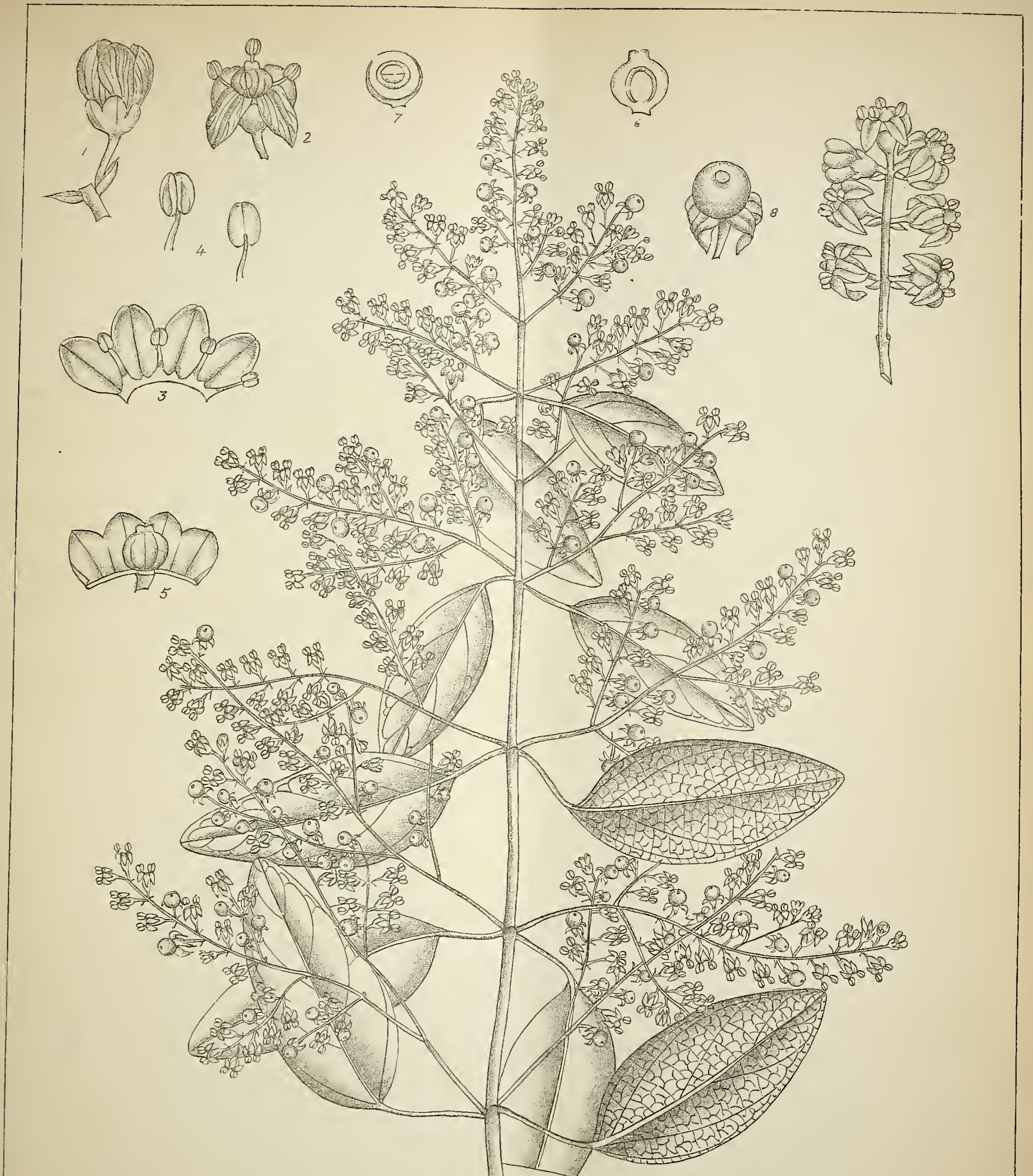
SALVADORA WIGHTIANA. (Planch.) A middling sized tree, trunk generally crooked, bark very scabrous and deeply cracked, branches exceedingly numerous their extremities drooping with much the appearance of the weeping willow, leaves coriaceous oval or oblong entire very smooth and shining on both sides, 1-2 inches long by about 1 inch broad, veins sub 3-5 nerved at the base but quite inconspicuous except in dried specimens, petioles 9-10 lines long, stipules none, panicles terminal and from the superior axils, flowers minute very numerous greenish yellow, pedicels about 2 lines long, bracts minute, calyx, corol, &c. as in the generic character, the lobes of the corol revolute, berry smooth red very minute× juicy smaller than a grain of black pepper, embraced by the marcescent corol.—S. persica, *Roxb. Fl. Ind.* i. 389 (not *Linn.*) S. Indica, *Wight Ill. p.* 229, *t.* 181.

This tree is common throughout the Presidency in low lands in the plains and particularly in salt soil, the berries have a strong aromatic smell and taste like garden cresses; the bark of the root is very acrid and applied to the skin raises blisters, for which purpose the natives use it, and as a stimulant it might be of considerable efficacy. In Tamil the tree is called Opa, and in Teligu Pedda Waragu wenki, and it or an allied species is said to be the mustard tree of scripture; it is in flower and fruit all the year round.

Analysis. Opa

1. A flower bud.
2. A full flower, petals revolute.
3. Corol opened to show the stamens.
4. Anthers, front and back view.
5. Calyx, ovary and sessile stigma.
6. Ovary cut vertically, to show the solitary erect ovule.
7. The same cut transversely.
8. A fruit, the corol still persistent but withered.

× why "very minute"? ~~the Hoyle~~ (Ooyelay) a timber tree ~~seen~~ @ Trincomalie. Malitta, high tree last page Wood very tough & used for Gun Stocks & work requiring toughness & strength.—



Govindo. del: Dunphy Lith:

Salvadora Wightiana (Planch:)

SCHREBERA SWIETENIOIDES. (Nat. order Bignoniaceæ ?)

SCHREBERA. *Roxb.*—GEN. CHAR. Calyx tubular 5-cleft at length somewhat bilabiate, corol hypogynous infundibuliform, tube cylindrical, limb 5-7 parted, lobes patent cuneate obtuse, stamens 2 inserted on to the middle of the tube of the corol included, filaments very short, anthers oblong 2-celled, cells parallel dehiscing longitudinally, ovary free 2-celled, ovules 4 in each cell pendulous from near the apex, style simple exserted, stigma bifid, capsule pyriform woody hard scabrous 2-celled dehiscing loculicidally, valves septiferous, seeds 4 in each cell pendulous irregularly oval compressed produced into a long membranaceous wing, testa smooth, endopleura somewhat thick spongy, embryo exalbuminous, radicle short next the hilum, cotyledons oblong longitudinally plaited. A tree, leaves opposite unequally pinnate, leaflets subopposite cordate entire, panicles terminal, flowers small white. *Roxb. Fl. Ind.* i. *p.* 109.

SCHREBERA SWIETENIOIDES. (Roxb.) A large timber tree, trunk erect, bark scabrous, branches numerous spreading in every direction, leaves nearly opposite pinnate with an odd one about a foot long, leaflets 3-4 pair opposite or subopposite short petioluled, the lowermost largest and obliquely ovate or cordate while those towards the apex become narrower, all quite entire acute, smooth on both sides, 3-4 inches long, stipules none, panicles terminal thin trichotomous, bracts small caducous, flowers rather small white variegated with brown very fragrant at night, calyx at length 2-lipped with sometimes 2 lateral toothlets one on each side of the fissures which separate the lips, corol-tube 3-4 times longer than the calyx, capsule size of a pullet's egg. *Roxb. Fl. Ind.* i. *p.* 108;—*Wight. Ill. p.* 185 *tab.* 162.

This tree is not common, though to be met with in the forests on both sides of the Presidency, it is not rare in the Godavery forests on the east side, and pretty abundant in the Mudumullay forests on the west side; it is called Makkam in Teligu and Mogalinga in Tamil, and Moka on the Bombay side; the wood is grey or whitish, very close grained, heavy and durable, does not warp, used for making looms and many purposes with the natives, and well adapted for the purposes of the lathe. The drawing is copied from Wight's Illustrations, as I have no specimens at hand.

Dumphy lith.

Schrebera swietenioides, Roxb.

MILLINGTONIA HORTENSIS. (Nat. order Bignoniaceæ.)

MILLINGTONIA. *Linn. fil.*—GEN. CHAR. Calyx short campanulate equally 5-toothed, teeth revolute, corol hypogynous, tube infundibuliform long slender, limb bilabiate, the upper lip erect semi-bifid, the lower spreading 3 parted, divisions equal all imbricate, stamens didynamous inserted into the jaws of the corol exserted, anthers calcarate 2-celled, cells parallel equal, ovary 2-celled, ovules numerous, style simple, stigma bilabiate, capsule siliquæform long slender 2-celled 2-valved, partition parallel, seeds numerous round very thin surrounded with a fine transparent wing, embryo exalbuminous with 2 reniform emarginate cotyledons, and the radicle pointing to the hilum. A tree, leaves opposite supra-decompound very similar to those of a Melia, flowers white showy fragrant in terminal panicles.

MILLINGTONIA HORTENSIS. (Linn.) A large tree, trunk straight, bark deeply cracked in various directions and of a soft spongy nature, young parts and young leaves slightly pubescent, leaves opposite supra-decompound about 2 feet long, leaflets subcordate entire with long tapering obtuse points, glabrous on both sides, deep green, 1-3 inches long, petiolules 2-3 lines long, panicles terminal solitary much branched, bracts minute, flowers numerous 3-3¼ inches long pure white very fragrant, style as long as the corol, stigma of 2 broad lobes, fruit linear thin pointed pretty smooth 12 inches long by ¾ inch broad.—Bignonia suberosa, *Roxb. Fl. Ind.* iii. *p.* 111.

This is the so-called cork tree, abundant in a planted state in avenues, topes and gardens in the Presidency; it is wild, I believe, in Birmah, but I have never seen it in the jungles of this Presidency, though it is said to occur in some of our Southern Provinces; it is highly ornamental and a very rapid grower. The wood is hard, close-grained and of a pale yellow colour, not easily worked, flexible but not fibrous. A cubic foot unseasoned weighs 50-52 *lbs. and* 42 *lbs. when seasoned, and its specific gravity is* ·672, *it is well adapted for furniture and ornamental work; the spongy bark yields an inferior kind of cork.*

Analysis.

1. Portion of a panicle of flowers.
2. A flower bud.
3. A full flower.
4. Corol opened to show the insertion of the stamens and the spurred anthers.
5. Ovary, style and stigma.
6. Ovary cut vertically.
7. Ovary cut transversely.

Gouvêa del. Dumphy Lith.

Millingtonia hortensis. (Linn.)

TECTONA GRANDIS. (Nat. order Verbenaceæ.)

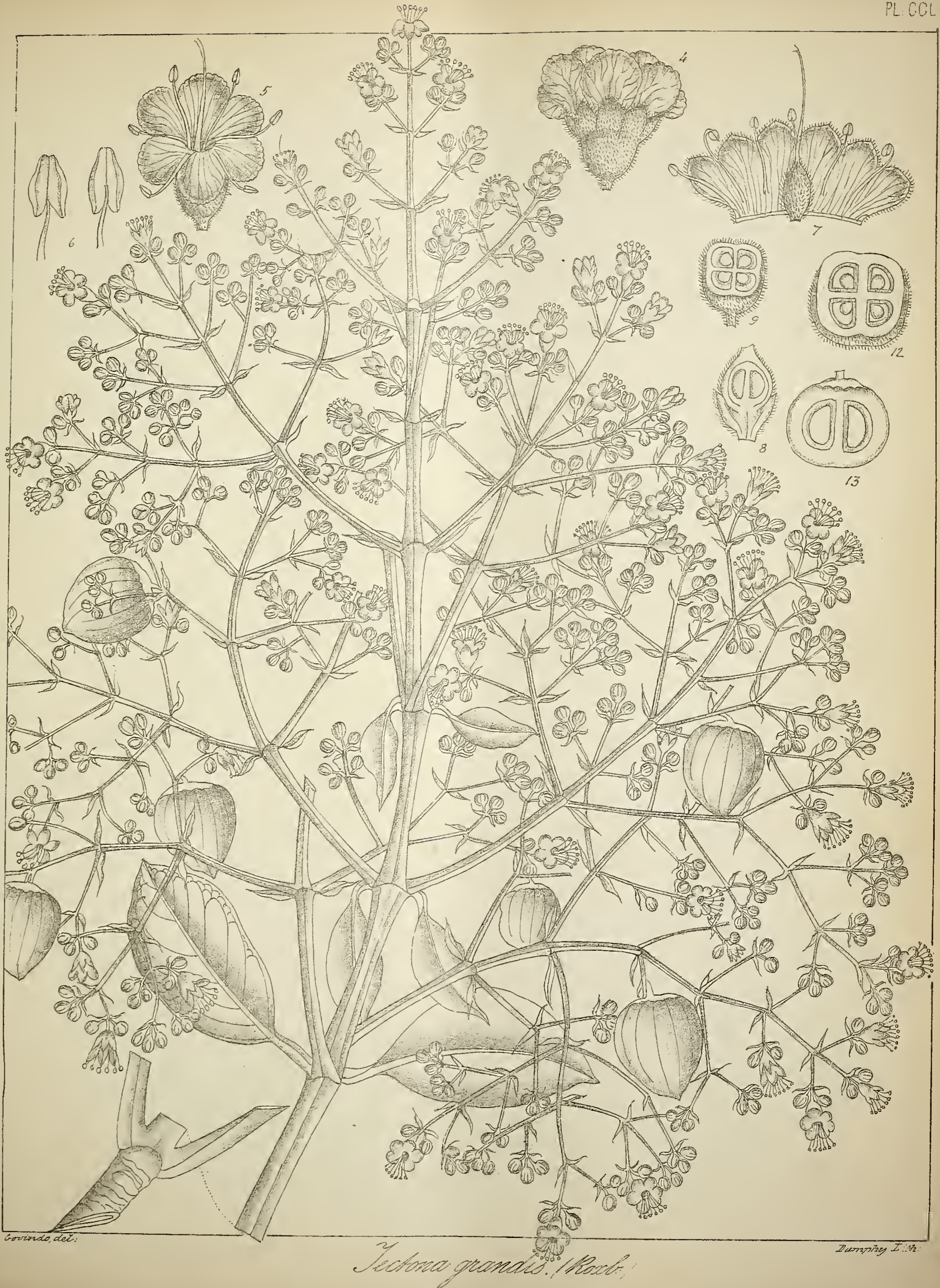
TECTONA, *Lin. fil.*—GEN. CHAR. Calyx campanulate 5-6 cleft in fruit becoming inflated, corol infundihuliform, tube short about equalling the calyx limb 5-6 lohed, lobes subequal spreading, stamens 5-6 inserted on the tube of the corol, filaments subequal, anthers exserted cordate 2 celled, cells parallel dehiscing longitudinally; ovary free 4 celled, cells 1 ovuled, style terminal filiform, stigma small acutely hifid. Drupe dry spongy hid in the enlarged calyx containing a 4 celled hard bony nut or pyreue, embryo without albumen, radicle short inferior. A lofty tree, furnished with minute stellate pubescence, leaves simple opposite or verticelled, flowers small white in large terminal panicles.

TECTONA GRANDIS. (Roxb.) An immense tree, trunk erect up to 80-100 feet high and in girth up to 22 feet, bark ash-colored and scaly. Young shoots 4 sided, sides channelled, leaves opposite oval acuminate a little scolloped, above scabrous, below covered with whitish stellate often silvery scales, 1-2 feet long by 8-16 inches broad, petioles short thick generally 1-1½ inch long, panicles terminal very large dichotomous, hoary, furnished with lanceolate bracts at the divisions, flowers, fruit, &c. as in the generic character. *Roxb. Fl. Ind.* i. 600.

This is the well known Teak-tree which yields one of the most valuable timbers in the world, it grows to perfection on the Anamallay mountains at about 2500 *feet elevation, and some of these mountain trees reach a girth of about* 22 *feet and a straight trunk of some* 80 *or* 90 *feet to the first bough, it is quite confined to the dry deciduous tracts of forest and is never found growing in the moist evergreen forest called sholah, though many of these tracts dovetail in and out of the Teak tracts, the tree is also found of very fine growth in a long belt of forest on the confines of Mysore and Wynad from Mudumullay in the south up to Coorg, elevation* 2000 *to* 3000 *feet, also in portions of South Canara, Malabar, Cochin and Travancore, often not much above sea level, but always in the vicinity of the range of ghats and on the western side, in all these low elevation tracts I have never met with a tree above* 9 *feet in girth and seldom over* 6 *or* 7, *but yet it is of fine growth and beautifully straight. Equally fine Teak is also found in certain tracts in the vicinity of the Godavery. In other parts of this presidency, such as the east side of the ghats in Tinnevelly, Salem, Cuddapah, North Arcot, &c., teak is often met with on the mountains, but it is always of very poor growth and in a measure stunted; the tree rises on the mountains to a little above* 4000 *feet elevation, but at any elevation much above* 3000 *it is of poor growth. Beyond this presidency fine teak is found in parts of the Bombay presidency (particularly North Canara), in Birmah and in Java, Sumatra, &c. The tree has been said to come to maturity in about* 80 *years and it probably does so in the rich alluvial soil about the base of our mountains, where its growth is rapid and its dimensions never very large; this is however certainly not the case on the mountains, for I have cut many very large trees on the Anamallays quite in their prime, which by their rings were evidently over* 200 *years old. The specific gravity of Malabar teak is about* ·720, *that of Birmah teak somewhat less. Malabar teak seasoned weighs about* 45 *or* 46 *lbs. the cubic foot, and unseasoned* 55 *to* 60 *lbs. Birmah teak is said when seasoned to weigh* 37 *to* 43 *lbs., but different conditions of growth cause great variations. The wood is very hard but easily worked and though porous very strong and durable; in color it varies from yellowish white to brown, it is very oily when fresh, takes about* 2 *years to season thoroughly, it is in use for a countless number of purposes, but for ship building and house building it may be said to be unsurpassed, it makes excellent furniture, but it splits and splinters too readily to be considered first class for gun carriages. The tree produces a good oil which is used with paint as a substitute for linseed oil, and which makes a good varnish. The tree is universally known throughout this presidency by its native name Tek, and in Hindoostanee it is called Sàgwàn. It is very easily raised from seed and there are large plantations of it in this presidency; in a moist climate its growth is very rapid, particularly at first, and the seedlings grow up beautifully straight. Even in climates like Madras and Cuddapah the seedlings if well watered show a very straight vigorous and rapid growth for the first* 2 *or* 3 *years, but the trees afterwards do not succeed in any of these dry districts, and its cultivation would probably never repay the labor.*

Analysis.

1. The young seedling thrusting its way out of the fruit.
2. A young seedling more advanced.
3. A seedling in a still more advauced state.
4. A flower, showing the corol-lobes slightly hairy on the outside.
5. The same fully expanded, showing 6 petals (sometimes 5 only are present.)
6. Anthers.
7. Corol opened to show insertion of the 6 stamens (sometimes 5 only are present), the ovary, style and stigma, corol glabrous on the inside sometimes ciliate round the margin.
8. Ovary cut vertically.
9. The same cut transversely, showing the 4 cells.
10. Fruit enclosed in the enlarged inflated calyx.
11. Another view of the fruit, the enlarged calyx opened.
12. Fruit cut transversely.
13. The same cut vertically.



Govindo, del.

Dumphy Lith.

Tectona grandis. (Roxb.)

PREMNA TOMENTOSA. (Nat. order Verbenaceæ.)

PREMNA. *Linn.*—GEN. CHAR. Calyx truncate or sinuately toothed, corol-tube short the limb of 3, 4, or rarely 5 short teeth or lobes nearly equal or slightly 2-lipped, stamens 4 shorter than the corol or rarely exserted, ovary 4-celled with 1 ovule in each cell laterally attached at or above the middle, style filiform with 2 short acute stigmatic lobes, fruit a small succulent drupe with a hard 4-celled undivided kernel, seed solitary in each cell, without albumen. Trees or shrubs, leaves opposite undivided, flowers small in terminal trichotomous panicles or in opposite cymes or clusters forming a terminal spike-like thyrsus. *Benth. Fl. Aust.* v. *p.* 58.

PREMNA TOMENTOSA. (Roxb.) A middling sized or small tree, leaves ovate to cordate pointed entire or with a waved sinuate margin very densely downy and whitish underneath, light green and pubescent above, 4-6 inches long about 2½-3 broad, petioles round 1-1½ inch long, panicles middling sized terminal erect downy somewhat corymbiform their branches scattered, bracts filiform downy, flowers numerous small of a dirty greenish yellow, calyx campanulate 5-toothed permanent, corol throat woolly, upper lip 3 cleft, the under one emarginate, drupe size of a small pea and with the nut, &c. as in the generic character. *Roxb. Fl. Ind.* iii. 77.

A very common tree throughout the jungles of this Presidency, called in Teligu Naura and Nagal; the wood is hard, close grained and yellow, and is a good fancy wood; it is also found in Ceylon, where it is called Boosairu.

Analysis.

1. A flower.
2. The same, fully open.
3. A corol removed and opened to show insertion of the stamens.
4. Calyx, ovary, style and stigma.
5. Anthers.
6. Ovary cut vertically, showing the ovules attached to the centre of the axis.
7. Ovary cut transversely, showing 4 cells.
8. A fruit.
9. The fruit cut transversely, showing a hard bony 4-celled nut inside the sarcocarp (one or 2 cells often abortive.)

Gorrido del.   Dunphy. Lith.

Premna tomentosa. (Roxb.)

VITEX ALTISSIMA. (Nat. order Vebenaceæ.)

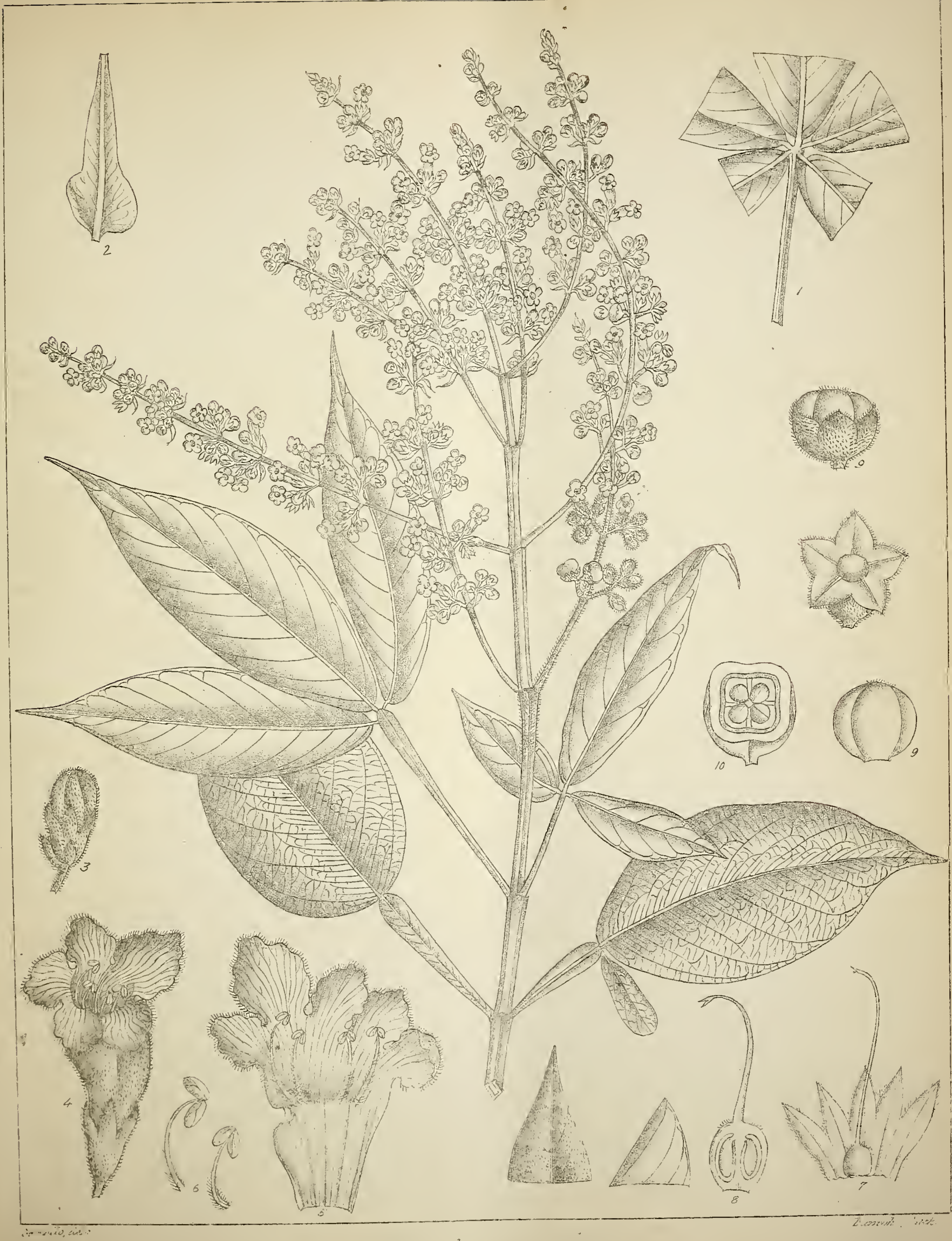
VITEX. *Linn.*—GEN. CHAR. Calyx 5-toothed or lobed. Corolla-tube short; limb spreading, 5 lobed, the lowest lobe larger and longer than the others and sometimes notched. Stamens 4, in pairs, ascending and exserted beyond the upper corolla-lobes. Ovary 2-celled or more or less perfectly 4-celled, with 1 ovule to each half-cell or cell, laterally attached at or above the middle. Style filiform, shortly and acutely 2-lobed. Fruit a succulent drupe, the putamen separating into 4 hard one-seeded pyrenes (or fewer by abortion.) Seeds without albumen. Trees or shrubs. Leaves opposite, usually of 3 or 5 digitate leaflets, very rarely single (or of a single leaflet.) Flowers in cymes, sometimes axillary but usually in terminal panicles either simple and spike-like or branched. Bracts very small.

VITEX ALTISSIMA. (Linn.) A very large tree, trunk erect of great girth, bark smooth, branches numerous spreading, young ones tetragonal, leaves opposite trifoliate or more rarely digitately 5 foliate, leaflets sessile elliptic oblong entire acute scarcely coriaceous subglabrous or slightly pubescent above, pubescent or downy beneath, paler beneath penniveined, 3-6 inches long by 1-2 broad, common petiole 2-4 inches long very broadly winged when young (the wing generally auricled at the base), often only slightly so in age, panicles terminal bracteated at the ramifications composed of few long simple opposite pairs of subverticelled downy spikes, flowers numerous small white with a tinge of blue, bracteoles linear lanceolate concave downy, calyx downy, segments rather unequal, corol lower lip large entire, upper shorter and 4 lobed, anthers as in the generic character. Ovary ovate 4-celled, ovules attached above the middle of the axis or near its apex, style as long as corol, stigma acutely bifid, drupe round of the size of a pea smooth succulent black, the putamen separating into 4 hard 1-seeded pyrenes or fewer by abortion. *Roxb. Fl. Ind.* iii. *p.* 71; —*Wight. Ic.* 1466.

This tree is found throughout the Presidency, and is most abundant in all our western jungles, it is also found in Ceylon, parts of Bengal, Birmah, &c., it ascends the mountains to 4000 *feet elevation, one of our most valuable timber trees next to* 3 *or* 4 *of the reserved sorts, it is called Maila in Tamil, Myrole and Sampaga pala in Canarese, and Mililla in Ceylon; the wood is hard, durable and flexible, with a coarse grain, light brown in color, and does not split or warp; it is much in use for building, construction of carts, and many other purposes; it weighs* 63 *lbs. the cubic foot when seasoned and its specific gravity is* 1·008. Said to be the Kattu vanak of Travancore

Analysis.

1. Portion of a digitately 5-foliate leaf.
2. Base of the petiole of a leaf, showing auricled wings.
3. A flower bud.
4. A full flower.
5. A flower open, showing the insertion of the stamens.
6. Anthers.
7. Calyx opened, showing ovary and style, and acutely bifid stigma.
8. Ovary cut vertically, showing pendulous ovules; they are sometimes attached lower down the axis, but always above the middle.
9. Fruit.
10. Transverse section of fruit.



Vitex altissima. Linn.

GMELINA ARBOREA. (Nat. order Verbenaceæ.)

GMELINA. *Linn.*—GEN. CHAR. Calyx cup-shaped 4-5 toothed sinuate-lobed, corol-tube much dilated upwards or almost campanulate, limb oblique with 4 or 5 spreading lobes, the 2 upper ones sometimes united in an entire lip. Stamens 4 in pairs shorter than the corol, ovary 4-celled with 1 ovule in each cell pendulous from near the apex of the axis or attached at or above the middle, style filiform, stigma recurved entire or 2-4 lobed, fruit a succulent drupe the putamen hard or bony 4-celled or rarely 2-celled, seeds solitary in each cell without albumen. Trees or large shrubs, leaves opposite undivided, flowers rather large yellow in the Indian species, (or in others pink or blue) in irregular terminal panicles or simple racemes.

GMELINA ARBOREA. (Roxb.) A large tree with a light ash-colored generally smooth leprous-looking bark, trunk of considerable girth but rarely straight, leaves rhomboid ovate to cordate with a long acumination or quite rounded at the apex, entire or slightly scolloped, generally rather suddenly attenuated at the base, but sometimes deeply cordate, 3-5 nerved, furnished at the base with 2-4 prominent glands, densely downy on both sides when young with greyish mealy or golden velvetty tomentum, the upper surface often glabrous or subglabrous in age, 4-10 inches long 2-7 inches broad, petioles round downy 2-3 inches long, panicles terminal thyrsoid densely downy with greyish or golden tomentum, the bracts downy lanceolate deciduous, flowers numerous yellow tinged with brown, calyx small more or less 5-toothed hoary or densely downy, corol more or less downy, $1\frac{1}{2}$ to nearly 2 inches long, the tube declinate and much dilated upwards, the limb ample sub-bilabiate, lobes 5 rounded imbricate, the 2 upper small, the 2 lateral larger, the middle lower one much the largest and generally furrowed on the inside, anthers crescent-shaped the cells diverging, the filaments glanduloso-pilose, the longer pair considerably incurved, ovary glabrous 4-celled with 1 ovule in each cell pendulous from the apex of the axis, style about as long as the stamens, stigma entire or 2, 3, 4-lobed, fruit an oval or obovoid smooth yellow drupe about as large as a damson, the putamen or nut hard 4-celled. *Roxb. Fl. Ind.* iii. *p.* 84. G. Rheedii, *Hook. Bot. Mag. t.* 4395, and *Walps Ann.* iii. 239. Cumbulu, *Rheede Mal.* i. *t.* 41 ;—*Wight Ic.* 1470.

This valuable timber tree is common in every district in the Presidency (dry forests), and is also found in Ceylon, Bengal and Birmah ; it ascends the mountains to about 5000 *feet elevation ; it has generally only a short thick trunk, but I have often met with very fine trees in the richer parts of our forests and in ravines. It is called Goomar-tek and Pedda gomru in Teligu, Gumadi in Tamil, Goombari in Goomsur, Shewan in the Bombay Presidency, and Atdemmata in Ceylon; it flowers in February and March. The wood is highly valuable, much resembling teak, as light or lighter, the color the same and the grain rather closer, never warps or shrinks, and stands the action of water as well as any wood; it appears however to be very little known or utilised in most districts in this Presidency ; the natives use it in some parts for building purposes, decking of small vessels, and carving images and other purposes ; in Bombay it is much in use for carriage panels, in the Godavery districts the yokes for bullocks are generally made of it ; it makes excellent packing cases, palanquins, &c., and takes varnish very well ; the bark and root are used medicinally.*

Analysis.

1. Base of a 5-nerved leaf, underside showing 2 large hollow glands.
2. A flower bud.

3, 4. Views of the full flower.

5. Bracts.
6. Corol opened.
7. Front, back and side views of the anthers, filament glanduloso-pilose.
8. Calyx, ovary, style and simple recurved stigma.
9. A 2-cleft stigma.
10. A 3-cleft stigma.
11. A 4-cleft stigma.
12. Ovary cut vertically, ovules pendulous.
13. Ovary cut transversely, 4 cells each with 1 ovule. (All drawn from living specimens.)

Gmelina arborea, Roxb.!

BASSIA GRANDIS. (Nat. order Sapotaceæ.)

For Gen. Char. see letter-press to Pl. xli.

BASSIA GRANDIS. (Thw.) A very large tree, leaves glabrous (the young ones cano-sericeous) obovate or bnadly ovate abruptly and shortly pointed or rounded at the apex, cuneate at the base, prominently venose on the underside, 2-10 inc es long by 1-6 inches broad, petioles ½-1 inch long flat on the upper side, fascicles crowded at the apex of the branches adpressedly ulvo-pilose 4-6 flowered, pedicels about as long as the petioles, calyx 3-4 lines long 6-parted pilose on the outside and on the upper ıalf of the segments inside, corol white nearly double as long as the calyx, 6 lobed, stamens 12 in a single series, anthers apiculatε filaments slender and flexuose alternately shorter, style glabrous, stigma minute, ovary hairy 6-celled, ovules attached to the centre f the axis, fruit ovoid black-purple 1½ inch long.—Isonandra grandis, *Thw. En. Pl. Zey. p.* 176.

This fine tree is found in Ceylon, Central Provinces and Saffragram district at an elevation of 3-6000 *feet, called Meeria, theeeds yield an oil similar to that of Bassia longifolia.*

Analysis.

1. A flower.
2. Calyx opened and corol removed to show ovary and style, calycine segments hairy inside on the upper half.
3. Corol opened, 12 stamens alternately shorter.
4, 5. Anthers, front and back view.
6. Ovary and style.
7. Ovary cut vertically, ovules attached to centre of axis.
8. Ovary cut transversely, 6 cells. (Drawn from dried specimens.)

Analysis.

BASSIA PETIOLARIS. (*Vide Manual,* page cxl.)

1, 2, Full flowers.
3. The calyx 6-lobed in 2 series, the inner lobes the longer.
4. Calyx opened, lobes hairy on the upper half inside.
5. Corol opened, 12 stamens in a singlo row slightly imbricate or sub 2 rowed, alternately shorter.
6, 7. The longer stamens, front and back view, anthers bluntly 2-lobed at the apsx.
8. The shorter stamen front view, anthers sharply 2-lobed, one of the lobes long and recurved.
9. Apex of style and the hollow stigma.
10. Ovary cut vertically, ovules erect from near the base of the axis.
11. Ovary cut transversely, 6 cells.
12. Fruit. (Drawn from dried specimens.)

BASSIA NERIIFOLIA. (*Vide Manual,* page cxl.)

1. Calyx and style.
2. Corol open showing the 12 stamens in 1 row, or sub 2-rowed.
3. Anthers, front and back view.
4. Transverse section of ovary, 6 cells.
5. Fruit.
6. Ssed. (Drawn from dried specimens.)

Bassia grandis. (Thw:)

HARDWICKIA PINNATA. (Nat. order Leguminosæ.)

For Gen. Char. see letter-press to Pl. xxvi.

HARDWICKIA PINNATA. (Roxb.) A very large tree, leaves pinnate 4-8 inches long, leaflets coriaceous 5-6 alternate glabrous and shining, ovate or obliquely ovate to ovato-lanceolate bluntly pointed, variable in size up to 4½ inches long by 1¾ broad, pinnately veined and the veins looped near the margin, veinlets beautifully reticulated, generally minutely dotted on the underside (under the lens), petiolules 2-3 lines long, stipules minute ovate-lanceolate early deciduous, panicles terminal slender shorter than the leaves with 3-5 racemose branches, flowers minute on pedicels about ½ a line long with a bract at the base of each, calyx closely pressed by 2 scale-like bracteoles, 5-parted, segments imbricate the three outer longer than the 2 inner all ciliate and conspicuously pellucid dotted, anthers 10 all fertile attached to the filament by the centre of the back, filaments slender nearly double as long as the calyx, hairy at the base equal or subequal in length or alternately a little shorter, ovary and style hairy the latter slightly longer than the filaments, stigma small capitate peltate, ovule solitary pendulous from near the apex of the cell, legume indehiscent obovate coriaceous or almost woody, 2-2¼ inches long by 1 inch broad, sometimes compressed at the base below the seed and wing-like and often with a small recurved mucro at the apex, seed pendulous from the apex, testa brown membranaceous, cotyledons replete with cells filled with balsam, the radicle and plumule protruding from the apex of the legume. *Roxb. Fl. Ind.* ii. 425.

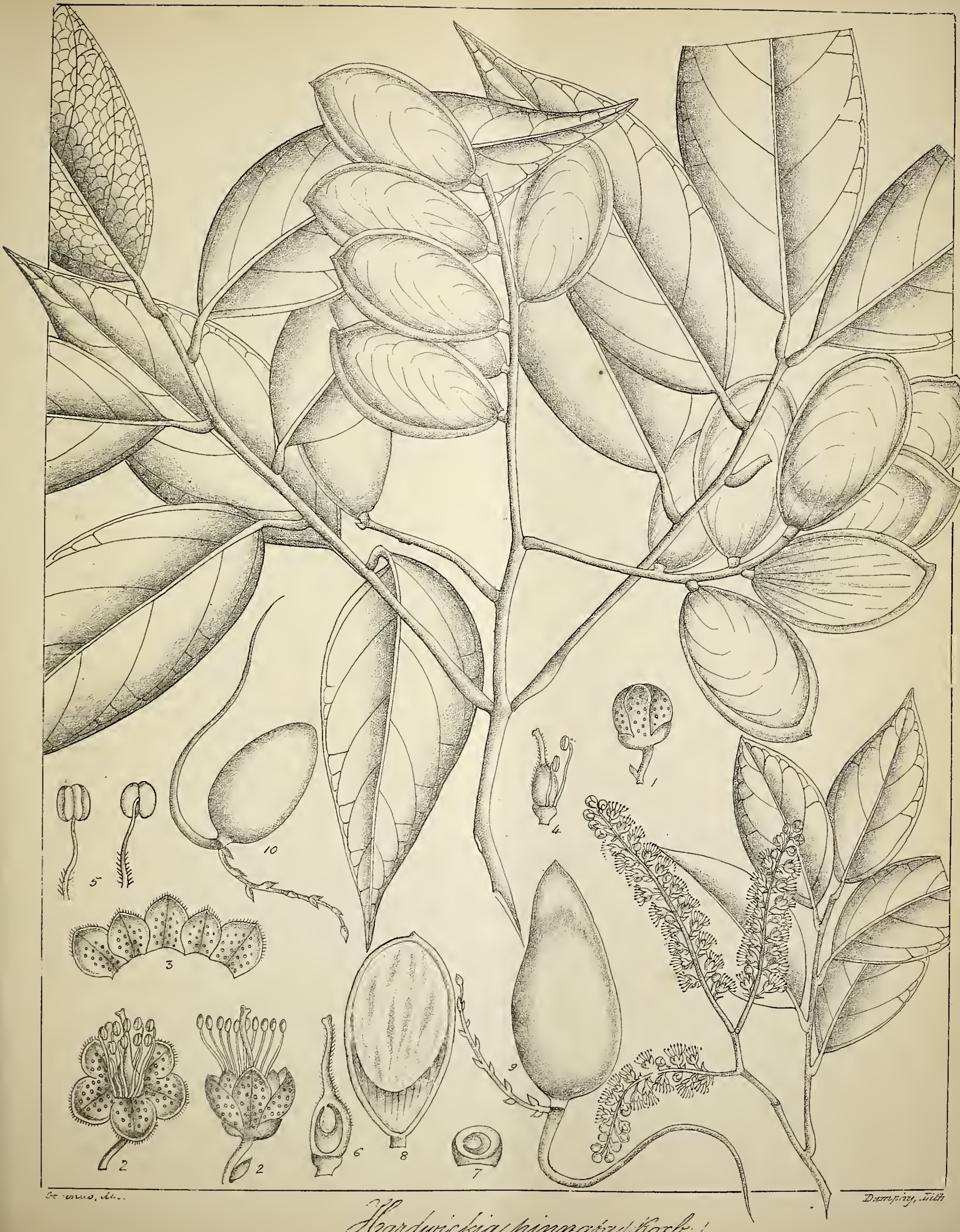
This tree is very common on the S. Travancore ghats (Asamboo hills) in the dense moist forests up to 3000 *feet elevation, and I have also found it on the Tinnevelly side just above Courtallum (between the 2nd and 3rd falls) and on the new Manjerabad ghat (S. Canara), about* 1500 *feet up from Siradi. The tree yields a dark red balsam almost exactly like the balsam of Copaiva, and with all the same properties; the tree is called in Travancore Matàyen Sampràni (which means fool's incense), and the balsam is extracted and used medicinally: to obtain it a deep notch is made into the heart of the tree, and after a time it begins to flow; the tree flowers in March and April, and the legumes ripen in July. The wood is much used by the coffee planters and others for building purposes.*

The following is Mr. Broughton's report upon some of the balsam which I submitted to him for analysis.

This substance appears on examination to consist of a solution of certain chemically different resins in an essential oil, and is in fact an Oleo-resin. Like the wood oils from the different species of Dipterocarpus, it greatly resembles both in composition and properties the Copaiva balsam, though it lacks the transparency and light yellow color of the latter. It is nearly entirely soluble in Ammonia but does not produce a clear solution. The essential oil has the same composition as that from Copaiva balsam. It boils (on the Neilgherries) at a temperature of 225° *C. It rotates the plane of polarization to the left, but in a different degree to that found with the oil from Copaiva. This essential oil occurs in different amounts in the balsam, and more abundantly in the fresher collected specimens, these are quite fluid, but other specimens are almost semi-solid, doubtless owing to the evaporation and oxidation of the oil. The oil is best obtained by prolonged distillation of the balsam with water. By this means I have obtained from an apparently old specimen of balsam* 25 *per cent of oil, and in the most recently collected specimen I have obtained over* 40 *per cent. I have made many attempts, but have not obtained any crystals of Copaivic acid from the balsam. The solid resins are of an acid character, but the balsam does not solidify so strongly as that of Copaiva after being heated with Magnesia. The oil can be separated from the balsam by Ader's process, but it is obtained in a very impure and colored state. There appears little doubt that this balsam could effectually substitute Copaiva balsam in medicine. But the appearance of the specimens that I have received is greatly inferior to the latter, and they could not certainly under present circumstances compete with the Brazilian balsam in the European markets. Whether the essential oil obtained from the balsam could be profitably manufactured and exported I am unable to say, as I am not acquainted with the cost of the balsam in Travancore. This balsam is well worthy of being tried in medicine, since from its composition it appears to be well suited for employment, at least in the neighbourhood of the country in which it is collected.*

Analysis.

1. A flower bud showing the bract at base of pedicel and 2 scale like bracteoles at base of calyx.
2. A full flower.
3. Calyx opened.
4. Ovary and disk, showing insertion of stamens.
5. Anthers, front and back view.
6. Ovary cut vertically, 1 pendulous ovule, style and stigma.
7. Ovary cut transversely.
8. Ripe legume cut open, showing the pendulous seed nearly filling the whole cavity.
9. A legume germinating, the long radicle and plumule protruding from its apex.
10. Germinating seed removed from the same. (Drawn from specimens in spirit.)



Gr.inus, del. Dumphy, Lith.

Hardwickia pinnata, (Roxb.)

SANTALUM ALBUM. (Nat. order Santalaceæ.)

SANTALUM. *Linn.*—GEN. CHAR. Calyx campanulate 4-(rarely 5-) cleft, segments ovate or triangular, furnished inside with small bundles of hairs behind each of the anthers, stamens equal in number to the calyx lobes and opposite to them, filaments ligulate or filiform, anthers ovoid 2-celled, cells deeply bilocellate dehiscing longitudinally by a single cleft, pollen subglobose, disk concave adhering to the bottom of the calyx its lobes alternating with the segments of the calyx, ovary free at first, semi inferior at the time of flowering and afterwards inferior. Style conical or cylindric, stigmas 2-4. Ovary 1-celled, placenta ovoid acute erect from the base bearing as many ovules as there are stigmas let into grooves around its base but pendulous from the apex by long filiform threads, drupe globose or obovoid crowned with a scar where the lobes of the calyx have broken off, putamen woody 1-celled, seed inverse, albumen copious fleshy, radicle superior as long or longer than the cotyledons. Trees or shrubs, leaves opposite or rarely both opposite and alternate on the same plant or all alternate, entire; flowers small in axillary and terminal cymose panicles.—Sirium, *Linn.* Fusanus, *Linn.* Mida, *A., Cunningh.*

SANTALUM ALBUM. (L.) A small tree, about 30 feet high, rarely reaching 18 inches in diameter, bark brownish and scabrous with longitudinal fissures, branches numerous spreading and forming nearly a spherical head, leaves opposite ovato-elliptic obtusely pointed entire glabrous glaucous beneath, $1\frac{1}{2}$ to 3 inches long by 1-$1\frac{1}{2}$ broad, petioles $\frac{1}{2}$-$\frac{3}{4}$ inches long, panicles cymose axillary and terminal much shorter than the leaves, branchlets opposite bracteated at the base 3-8 flowered, flowers about $1\frac{1}{2}$ lines long on short pedicels straw-colored at first, turning afterwards to a deep-purple, inodorous, calyx 4-parted, disk of 4 rounded lobes which are alternate with the anthers and segments of the calyx (in one variety these lobes are obcordate and notched), stigma 3-4 lobed, drupe blackish purple $\frac{1}{2}$ an inch or a little more in diameter, nut or putamen spherical hard and bony marked with 3 equi-distant elevations from the apex which run a little down the sides, the rest as in the generic character. *Roxb. Fl. Ind.* ii. *p.* 442.

This is the valuable sandalwood tree, it is most abundant almost throughout the dry parts of Mysore, and in all the tracts to the east of the Nilgiris in the Collegal, Bhowani and Sattimangalum taluqs of Coimbatore, and in the Denkinacottah taluq of Salem, less abundant on other hill tracts in the Salem, Trichinopoly and N. Arcot districts, such as the Shevaroys, Kollay Mallays, Putchc Mallays, Javadies, &c., and on the Palneys in Madura, and a variety with the wood almost scentless is found on our eastern coast mountains; this was described by Roxburgh as the S. myrtifolium, but it only differs slightly in the shape of the leaves which are more lanceolate, and in the scales or lobes of the disk being jagged. The tree is found up to about 4000 feet elevation, it is only the heart wood that is scented and of any value, and trees grown slowly on rocky and dry poor soil produce the maximum of this, where the tree is found in rich alluvial soil on the banks of rivers, &c., it is of very fine growth but produces no heart wood and is consequently valueless, it is often cultivated in gardens in the plains and may be seen in many gardens in Madras itself, the wood is yellow and deliciously fragrant, when unseasoned it weighs 72-75 lbs. and when seasoned 58 lbs., and its specific gravity is ·924, it finds an immediate sale at 4 Rs. or 4-8-0 per maund of 28 lbs., and it is chiefly employed for making all sorts of ornamental articles, such as small tables, work boxes, glove boxes, card cases, &c., a valuable oil used as a perfume is distilled from the roots, and chips or pieces of the heart wood. The tree is universally known in this presidency by the native name Sandal and Chundanum and the same tree is I believe found in parts of the Eastern Archipelago; the wood and the sawdust are burned as incense in native temples. The Forest Department have now large plantations of this valuable tree, it grows readily from seed if slightly shaded but is very shy of transplanting, and after numerous experiments the plan now found best is to sow 2 or 3 seeds in the pit where the tree is to stand and at the same time a few chili seeds round them, the latter grow up before the Sandal seedlings and give them the necessary amount of shade whilst young, eventually the strongest of the 2 or 3 seedlings only is left in the pit the others being removed.

Analysis.

1. The panicle or cyme, highly magnified.
2. A flower bud, calyx valvate.
3. A flower.
4. A flower open.
5. The flower cut open, showing the 4-lobed calyx adnate to the tube of which is the disk with its 4 rounded lobes alternate with the stamens the ovary and a 3-lobed stigma.
7. Anthers, front and back view.
8. Ovary (with a 4-lobed stigma) cut open showing the fusiform placenta erect from the base.
9. The placenta removed from the ovary showing the ovules let into grooves at its base.
10. The same, ovules detached from their beds, showing that they are pendulous from long filiform threads.
11. A fruit.
12. The nut or putamen removed from the fruit, showing the 3 elevated lines which run from the apex.
13. The nut cut vertically, showing the embryo in fleshy albumen.
14. The embryo, with its superior radicle. (All drawn from living specimens.)

Intellectual Observer for Sept. 1866 p. 73: on Sandal Wood.

Govindo del.

Santalum album. (Linn.)

PODOCARPUS LATIFOLIA. (Nat. order Coniferæ.)

PODOCARPUS, *L'Herit.*—GEN. CHAR. Flowers diœcious or rarely monœcious. *Male,* aments axillary or terminal solitary or fascicled on a common peduncle bracteated at the base or naked, cylindric obtuse thick or slender, anther-bearing bracts numerous crowded very shortly stipitate, anthers two 1-celled, cells subglobose dehiscing extrorsely. *Female,* flowers spicate, the spike generally short rarely lax 1-2 flowered, the rachis naked or furnished with several bracts, the terminal one involucriform large subdenticulate and partially enclosing the flower or young fruit, fruit fleshy oval or globose, nut bony, embryo in the axis of farinaceous albumen. Evergreen trees or shrubs, leaves coriaceous either opposite or subopposite and then many-nerved, ovate or elliptic, or approximated or crowded 1-nerved lanceolate or linear, sometimes dimorphous.

PODOCARPUS LATIFOLIA. (Wall.) A tall erect tree 40-50 feet high with a straight trunk, up to 4-5 feet in girth, diæcious, branches horizontal spreading, young ones angled, leaves opposite or subopposite thick and very coriaceous dark shining green, many-nerved, from ovate to elliptic or narrow lanceolate acute or mucronate narrowed at the base into a short dilated flat petiole, $2\frac{1}{2}$-5 inches long by $\frac{3}{4}$-$1\frac{1}{4}$ broad, petiole none except the short dilated base of the leaf, male aments bracteated at the base, 4-5 lines long thick obtuse axillary solitary or 2-3 on a very short peduncle, the antheriferous bracts ovate acuminate denticulate as are the lower bracts, anthers oblong, female peduncle about 6 lines long furnished with several bracts below and one large terminal one embracing the ovary or female flower, ovary glaucous, fruit globosely oval about 1 inch long by 9-10 lines in diameter, the receptacle often becoming fleshy and much enlarged. *Wall. Pl. As. rar.* 1. *p.* 26. *tab.* 30.

This is an exccedingly interesting discovery on the South Tinnevelly mountains, being the first Conifer detected in Southern India, and the order is not represented in Ceylon. It is a very handsome tree and exceedingly ornamental when only a few feet in height, and well worth cultivating ; if the species is really the latifolia of Wallich (and dried specimens were so named at Kew), the tree also inhabits the Khasya mountains in Bengal, and is found in Burmah. All the trees I examined were diæcious, and it does not quite answer to the description of latifolia (in DC. Prod.) ; it flowers in August and September and ripens its fruit in January and February ; the tree is most abundant where I first discovered it on the hills above Calcad in the dense moist forests 3000-5000 *feet elevation, where its native name is Neerambali (nerve tree). I have not myself seen it further north, but Mr. Hayne of the Forest Department informs me that he has lately detected it to the north of Courtallum. The timber appears to be very good, and a log of it was sent to England (to the reporter on Indian Indents) not long ago.*

Analysis.

1. The male inflorescence (lifo size.)
2. The femalc inflorescence (life size.)
3. Male inflorescence, much magnified.
4. Female inflorescence, much magnified.
5. The anther-bearing bracts, front and back view.
6. Young fruit.
7. Ripe fruit showing the fleshy receptacle on which it is sometimes seated.
8. Fruit cut transversely.
9. Seed cut vertically showing the embryo in the axis of fleshy albumen.
10. Embryo removed, 2 cotyledons and a long inferior radicle. (Drawn from living specimens.)

Govindo del.

Dumphy Lith.

Podocarpus latifolia. (Wall.)

PHYLLANTHUS EMBLICA. (Nat. order Euphorbiaceæ.)

PHYLLANTHUS. *Linn.*—GEN. CHAR. Flowers monæcious or rarely diæcious, in axillary clusters or solitary. Perianth segments 6 or rarely 5 or 4 in the males, imbricate in the bud, in 1 or 2 rows. Disk prominent and entire or lobed, or consisting of small distinct glands. *Male flowers*: stamens 3, rarely 2 or 5, united in a central column or free. *Female flowers*: ovary 3-celled, with 2 ovules in each cell. Styles free or united at the base, more or less 2-lobed. Capsule separating into 2 valved cocci or loculicidally dehiscent. Herbs, shrubs, or trees. Leaves alternate, entire, usually small and distichous, giving the smaller branches the appearance of pinnate leaves, in some American species wholly wanting. Stipules small, usually persistent. Flowers small.

PHYLLANTHUS EMBLICA. (Linn.) A good sized tree wholly glabrous or the smaller branches pubescent, leaves alternate remarkably distichous linear oblong mucronate glabrous about ½ an inch long by 1½ lines broad, petioles scarcely ½ a line long, stipules small scariose, margin lacerated; *male*, flowers very numerous axillary or below the leaves on pedicels about 1 line long, perianth segments 6, less than one line long, glands small round 1 between each of the segments of the perianth at the base inside, anthers 3-5 oblong erect on a short column which is formed by the conjunction of the filaments; *female*, flowers mixed singly with the males, perianth as in the male, disk cup-shaped half or more than half covering the ovary jagged round the apex and often more or less 3-cleft, style with 3 thick recurved 2-lobed branches, the lobes again bifid, fruit globose succulent smooth 6-striated about 1 inch or a little more in diameter with a hard 3-celled nut which is tardily dehiscent. *Roxb. Fl. Ind.* iii. *p.* 671. Emblica officinalis, *Gærtn.* Dichelactina, *Hance in Walp. Ann.* iii. 376.

This valuable timber tree is most abundant in almost every dry jungle and forest throughout the Presidency, particularly about the lower slopes of mountains, which it ascends to rather over 4000 feet elevation; it is also found in Ceylon, Bengal, Birmah, and Malacca, China, Java, Borneo and Japan, and it is often cultivated in native gardens and about temples. It is called 'Amlà in Hindostanee and Oosree in Teligu, and Nelli in Tamil, the fruit is eaten and made into tarts and pickled, raw they are very acrid but excellent to chew to keep off thirst; the wood is hard, fibrous, and flexible, tolerably close and straight grained, of a red color and durable, unseasoned a cubic foot weighs 58-62 lbs. and when seasoned 46 lbs., and its specific gravity is ·736, it is remarkably durable under water, on which account it is much in use for well rings; it is also much used for building purposes, furniture, gun stocks, and many other purposes, and is adapted for turning; the bark is strongly astringent and is used for tanning, and as a cure in diarrhœa; in the Bombay Presidency the tree is called Awlà.

Analysis.

1. A flowering branch magnified.
2. A leaf and stipule magnified.
3. A male flower bud, sepals imbricate.
4. A full male flower showing the glands in the sinuses at the base of the segments.
5. The column of stamens removed from the flower, 3 anthers (there are sometimes 4 or 5.)
6. The same opened out (it easily separates), showing that the column is formed by the adhesion of the filaments and that the anthers are fixed by the centre of the back.
7. Anthers, front and back view.
8. Female flower showing the style with its 3 recurved branches.
9. The same fully open showing the cup-shaped lacerated disk.
10. Disk opened out showing the ovary.
11. Ovary cut vertically, ovules attached to centre of axis.
12. Ovary cut transversely, 3 cells with 2 collateral ovules in each. (All drawn from living specimens.)

Govindoo del.

Dumphy lith.

Phyllanthus Emblica (Linn:)

BISCHOFFIA JAVANICA. (Nat. order Euphorbiaceæ.)

BISCHOFFIA. *Blume.*—GEN. CHAR. Diœcious or sometimes monœcious. *Male,* calyx segments 5 valvate very concave at first enclosing the stamens, afterwards revolute, stamens 5 opposite the segments on short filaments inserted on the pedicel of a large flat peltate inconspicuously 5-lobed fimbriate abortive ovary. *Female,* calyx segments 5 lanceolate slightly imbricate very soon deciduous, ovary 2-3 celled with 2 collateral ovules in each cell attached to the centre of the axis, styles equalling the number of cells in the ovary entire long filiform recurved, fruit a globular drupe enclosing 2-3 indehiscent cocci. A tree, leaves alternate trifoliate rarely 5-foliate, flowers very small the male very numerous in very compound axillary panicles, the female in looser and less branched panicles or racemes. *Blume. Bijdr. p.* 1168. Andrachne, *Roxb. Fl. Ind.* iii. *p.* 728. Microelus, *WA. in Edinb. New Philos. Journ.* 14, 298. Stylodiscus, *Benn. in Horsf. Pl. Jav. rar. p.* 133.

BISCHOFFIA JAVANICA. (Bl.) A very large tree with a tall erect trunk often of great girth, leaves 8-12 inches long of which the common petiole is 3-5 inches, trifoliate or very rarely with 5 leaflets, leaflets membranaceous to coriaceous elliptic ovato-lanceolate or oblong to obovate with a long sudden acumination coarsely crenate, smooth on both sides, 3-6 inches long by 1½-2 inch broad, on short petiolules, stipules membranaceous caducous, stipels minute filiform caducous leaving a black gland-like speck. *Male,* flowers greenish crowded in broad panicles much branched and shorter than the leaves; *female,* flowers in looser and less branched panicles or simple racemes, the flowers, &c. as in the generic character, drupe round smooth of the size of a small cherry. *Blume. Miq. Fl. Ind.* 1. *part* ii. 363. B. trifoliata, *Hook. Ic. Pl.* 1. 844. Andrachne trifoliatus, *Roxb. Fl. Ind.* iii. *p.* 728. Stylodiscus trifoliatus, *Burm.* Microelus Ræperianus, *WA. l. c.*

This very valuable timber tree is rather common throughout the Presidency, being found both on the eastern and western side, in some of our richer tracts it grows to be an immense tree, and it ascends the mountains to 5000 *feet elevation; it also inhabits Northern India, Borneo, the Archipelago, S. China and the Philippines, but appears to be absent from Ceylon; it is the only known species of the genus. It flowers in February and ripens its seed in May and June; the timber is reddish, very hard and durable and much in use in some parts with planters and others for building, planking, &c., but it is very little known or utilized in general, and should receive more attention. In the Madura district and parts of Tinnevelly it is known by the name of Modagerri vembu; and I have known planters using it under the name of red cedar; on the Bombay ghats it is called Boke. From Roxburgh's description the tree is sometimes monœcious, but I have not noticed this myself nor have I observed glands (or staminodia?) in the female flower, or* 4 *styles and* 4 *cells to the ovary, but both apparently occur (vide description in DC. and Roxb.),* 2 *styles and* 2 *cells to the ovary occur in some, panicles nearly in the same proportion as* 3 *styles and* 3 *celled ovaries; the figure here given represents a branch of the female tree and a portion of a male panicle, all drawn from living specimens collected on the Nilgiris; the foliage is very variable, and all DC.'s varieties might be gathered off one and the same tree.*

Analysis.

1. Portion of a panicle from the male tree.
2. A male flower bud, the concave calyx segments partly enclosing the anthers.
3. A male flower more advanced.
4. The same fully expanded, showing the calyx segments revolute and the filaments attached to the pedicel of the abortive ovary or central disk.
5. Anthers, front and back view.
6. Female flower with 2 styles, showing the bract at the base of the pedicel and the lanceolate calyx segments.
7. Ovary of the same cut vertically, showing the ovules attached to centre of axis.
8. Ovary of the same showing only 2 cells and 2 collateral ovules in each cell.
9. Female flower with 3 styles.
10. The same opened.
11. Ovary of the same, showing 3 cells.

Govindo, del.

Dunphy, Lith.

Bischoffia Javanica. (Bl.)

BRIEDELIA RETUSA. (Nat. order Euphorbiaceæ.)

BRIEDELIA. *Willd.*—GEN. CHAR. Flowers monœcious. Calyx 5-lobed to nearly the base valvate in bud, petals 5 small similar or nearly similar in both sexes, or entire in the female, dentate in the male. *Male*, disk single large saucer-shaped adnate to the bottom of the calyx. Stamens 5 inserted round a central style-like column a little below its apex. *Female*, disk double the outer thick and cupular adnate to the wall of the calyx, inner one adnate to the inside of the outer disk very thin membranaceous more or less 5-lobed, the lobes irregularly cut and jagged. Ovary 2-celled ½-enclosed by the double disk, ovules 2 in each cell pendulous from the apex of the axis, styles 2 shortly bifid, fruit globular or ovoid succulent enclosing 2 (or rarely 1) indehiscent cocci. Seed albuminous, radicle very short superior, cotyledons broad flat foliaceous. Trees, shrubs or scandent shrubs, leaves alternate short petioled more or less distichous, the primary veins usually prominent and parallel, flowers in axillary bracteated clusters or from the abortion of the leaves appearing as if in long axillary spikes.

BRIEDELIA RETUSA. (Linn.) A large tree, trunk pretty erect and with the larger boughs occasionally armed, leaves from elliptic or oblong to obovate, bluntly pointed or very retuse or emarginate at the apex, entire or slightly crenulated, more or less coriaceous glabrous above, glaucous sub-glabrous or more or less hairy beneath, primary veins 15-22 parallel rarely forked, very prominent beneath, veinlets prominent and parallel and the venules beautifully reticulated, very variable in size, up to 5½ inches long by 3½ inches broad, petioles 3-4 lines long, flowers greenish yellow in axillary sessile heads or from the abortion of the leaves on the young ramuli in long axillary and terminal spikes collected in sessile heads with the interstices naked, calyx slightly hairy; *male*, staminal column slightly 2-lobed at the apex, petals glabrous broadly ovate dentate, clawed and cucullate at the base, disk flat or slightly concave, anthers attached at the centre of the back at first erect afterwards versatile; *female*, petals lanceolate entire, disk double the outer one thick and cupular subentire or crenulate, the inner membranaceous more or less 5-lobed and much jagged at the margin, ovary, styles, &c. as in the generic character, fruit globular size of a pea succulent black enclosing two indehiscent pyrenes.—Clutia retusa, *Linn. Spec. Pl. Ed.* 1. *p.* 1475. Briedelia retusa, *Spreng.* Briedelia spinosa, *Roxb. Fl. Ind.* iii. 735; et B. crenulata, *l. c. p.* 734.

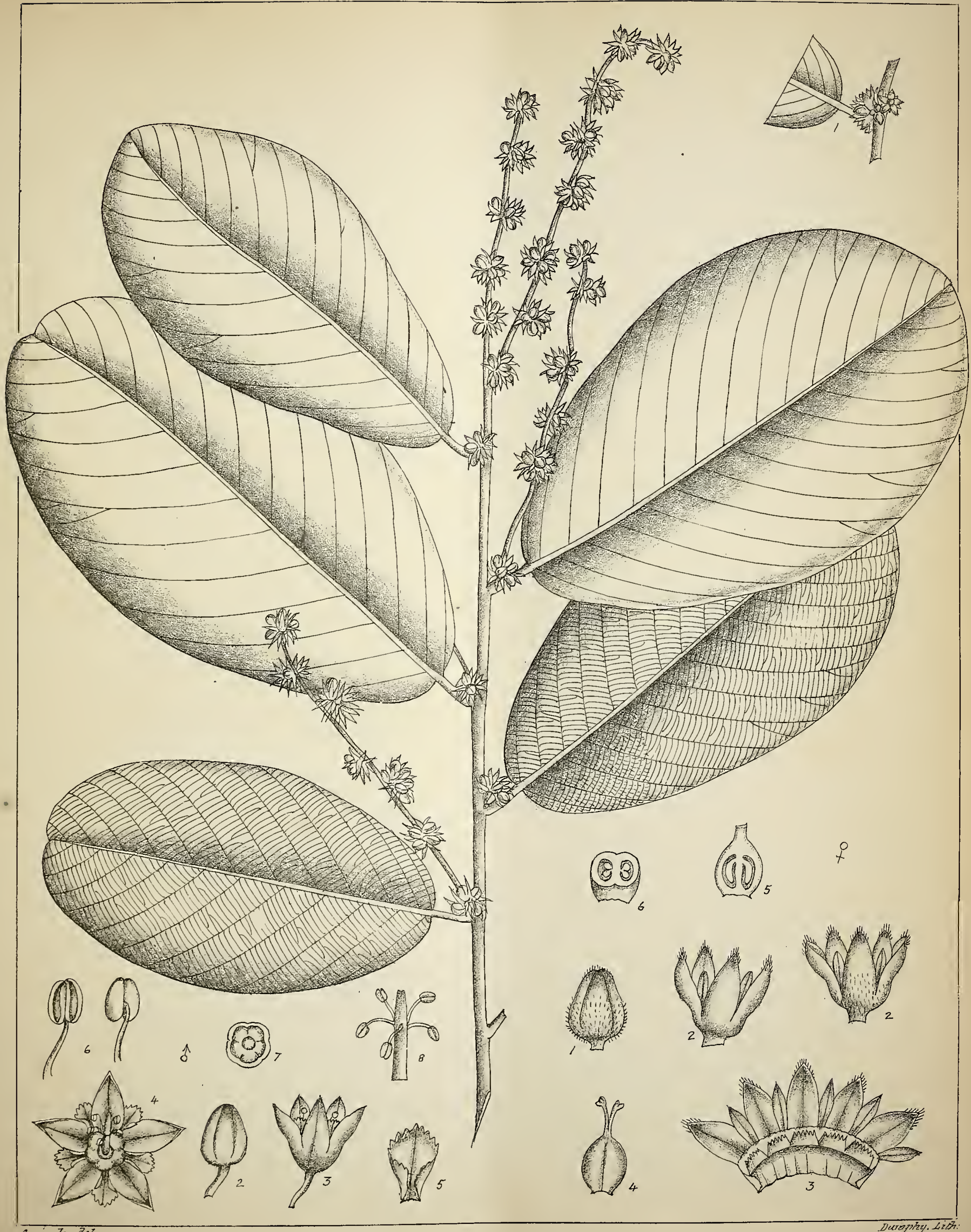
This is a very valuable timber tree common in most jungles and dry forests throughout the Presidency, and in Ceylon and Bengal. On the eastern coast it is known by the Teligu names of Kovàmán, Koramaddi, and Duriamaddi, in Tinnevelly Adamaruthu, and in Goomsur Kosi; the wood is of a dirty red or copper color, very stiff, strong, close-grained and durable, but not easily worked. A cubic foot unseasoned weighs 68-70 *lbs. and* 60 *lbs. when seasoned, and its specific gravity is* ·960; *it is used for house building, construction of carts, agricultural implements, railway sleepers and a variety of other purposes, and it stands the action of water; the bark is a strong astringent. Cattle eat the leaves greedily and they are supposed to act as a vermifuge.*

Analysis.

1. Portion of a specimen in which the inflorescence is only in axillary heads and not forming long spikes.

Male.—2. A flower bud, calyx valvate.
3. A flower.
4. The same fully open, showing insertion of the petals under the disk.
5. A petal showing that it is dentate, and cucullate at the base.
6. Anthers, front and back view, filament attached at the centre of the back.
7. The flat saucer-like disk.
8. The staminal column showing the insertion of the 5 stamens below its apex and its 2-lobed point.

Female—1. A flower bud.
2. Full flowers.
3. A flower opened showing the lanceolate entire petals and the double disk, the outer thick and cupular adnate to the calyx, the inner thin and membranaceous 5-lobed and much jagged.
4. Ovary and the 2 bifid styles.
5. Vertical section of ovary, showing the pendulous ovules.
6. Transverse section of ovary, showing the 2 cells, 2 ovules in each cell. (All drawn from living specimens.)



Govindo. del.   Dunphy. Lith:

Briedelia retusa (Linn.)

CEPHALOCROTON INDICUM. (Nat order. Euphorbiaceæ.)

CEPHALOCROTON, *Baill.*—GEN. CHAR. *Male,* calyx valvate 4-3 parted, petals 0, disk 0, stamens 4-8 inserted round the rudiment of an ovary, when in a single row alternate with the lobes of the calyx, when in 2 rows the inner alternate with the outer, filaments free much exserted, anthers fixed by the middle of the back, cells equal adnate their whole length introrse, rudiment of ovary small and filiform or obovoid-cylindric, truncate, or 2-3-cleft. *Female,* calyx 5-8 parted slightly imbricate the segments sometimes pinnatifid, disk 0 or hypogynous, petals 0, ovary 3-celled, cells 1 ovuled, style 3 joined at base into a short or long column, free above and spreading and irregularly twice or 3-times di-trichotomous, the divisions or arms papilloso-asperous, capsule tricoccous 3-seeded or less from 1 or 2 of the cells being abortive, seeds not strophiolate subglobose. Trees or shrubs, with alternate entire or toothed bistipulate leaves, often pellucido-punctate, flowers monœcious the male in compact heads, the female few at the base of the flowering peduncles which are terminal or spuriously axillary or leaf-opposed.—Adenochlæna, *Baill.* Chloradenia, *Baillon.* Adenogynum, *Reichb.*

CEPHALOCROTON INDICUM. (Bedd.) A good sized tree up to 6-7 feet in girth, young parts and young leaves sparingly furnished with mealy stellate pubescence, leaves alternate ovate, oblongo-ovate or almost elliptic entire, more or less pointed and generally mucronate, membranaceous when young, in age subcoriaceous subglabrous except the costa, sometimes inconspicuously dotted on the under side, $2\frac{1}{2}$ to 6 inches long by $1\frac{1}{4}$-3 broad, the pinnate veins very prominent and raised beneath 5-7 on each side, the veinlets and venules also prominent and reticulated, petioles $1\frac{1}{2}$-$1\frac{3}{4}$ inch long channelled above, inflorescence in terminal spikes 2-3 inches long, all the parts furnished with very short stellate rather mealy pubescence, male flowers very numerous, in dense compact sessile interrupted heads along the whole length of the flowering peduncle, calyx hardly more than $\frac{1}{2}$ a line long 4-parted valvate and quite globose in bud, stamens 4 in a single row round the base of the rudimentary style more than twice as long the calyx-segments, rudiment of the style filiform rather shorter than the segments inconspicuously 2-lobed at the apex ; female flowers few at the base of the flowering peduncle 5-6 lines long (including the styles), calycine segments 7-8 lanceolate entire imbricate at the base often unequal in length sometimes with glands on the outside at the base, disk 0, the 3 styles joined into a short or elongated column at the base, free and much spreading above and there each divided into 2 arms which are again bifurcate, all very papilloso-asperous, capsule tricoccous subglobose 9-10 lines in diameter slightly scabrous.—Adenochlæna Indica, *Bedd. in Distrib.*

This interesting tree is very common in the dense moist forests on the Anamallays, Tinnevelly and Travancore ghats, 1500-4000 *feet, generally on the banks of streams, and I have also found it sparingly in Coorg and S. Canara ; it is to be met with in flower and fruit at all seasons. I am not acquainted with its timber or uses, but the former is said by the natives to be very good and in use for building purposes.*

Analysis.

1. A male flower-bud, sepals valvate.
2. A male flower.
3. The same open showing the short rudiment of a style and the 4 long stamens alternate with lobes of calyx.
4. Anthers, front and back view, filament attached a little above the middle.
5. Female flower with a short column to the styles, calycine-segments slightly imbricate at the base and some furnished with black glands.
6. Female flower, the styles with a long column.

7, 8. Female calyx opened.

9. Ovary and styles.
10. Ovary cut vertically, ovules pendulous from near the apex of the axis.
11. Ovary cut transversely, 3-celled, cells 1-ovuled.
12. Capsule, 3 cocci fertile.
13. The same, 2 cocci only fertile.
14. Base of young leaf to show the stipules. (All drawn from fresh specimens.)

Govinda del. Dumphy Lith.

Cephalocroton Indicum (Bedd.)

CINNAMOMUM ZEYLANICUM, variety WIGHTII. (Nat. order Laurineæ.)

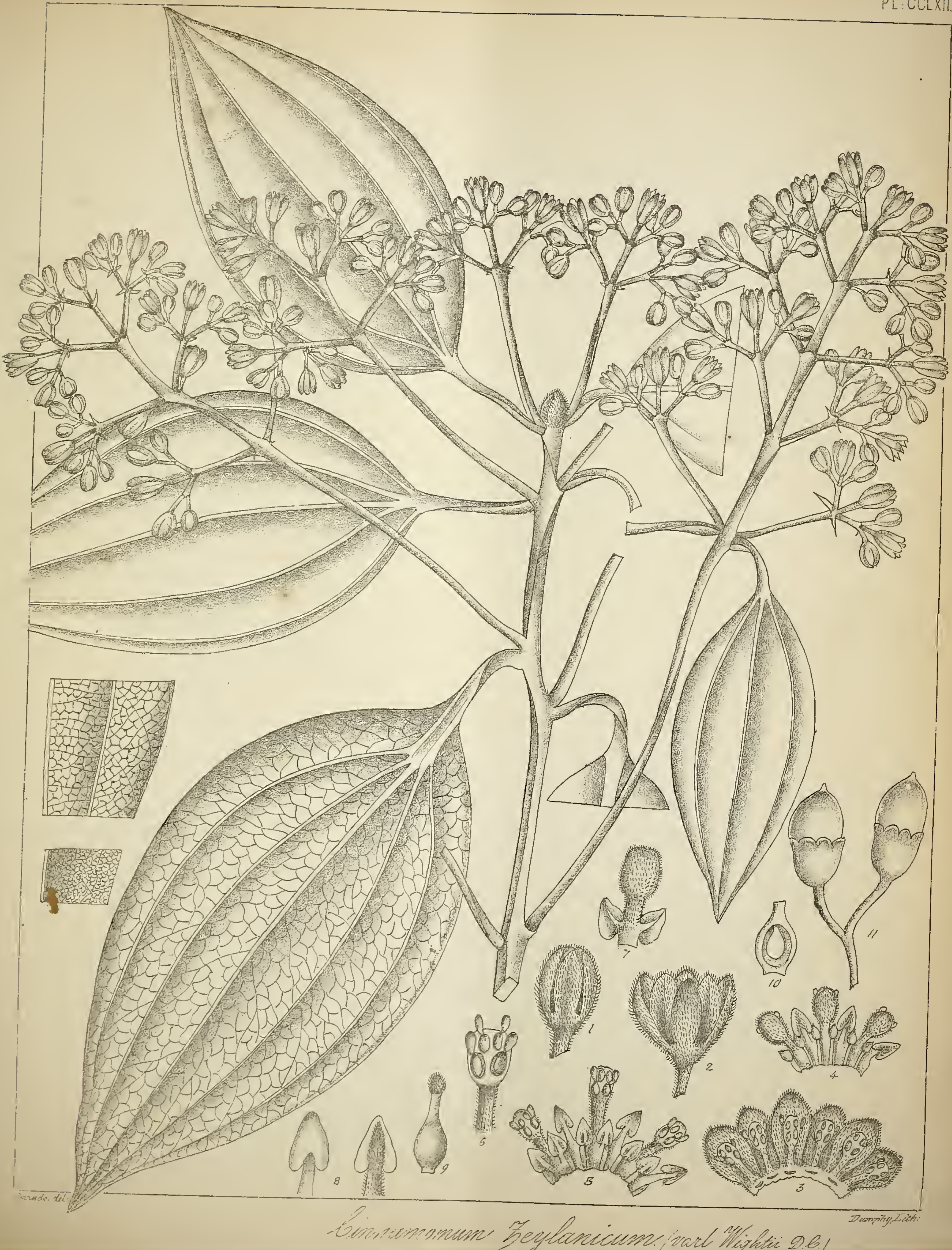
CINNAMOMUM. *Burm.*—GEN. CHAR. Flowers hermathrodite or often with a tendency to be unisexual, the females rather larger with a few sometimes only 1 stamen imperfect, the males smaller with a sterile ovary and the number of the parts of the perianth and of the stamens liable to occasional variation, especially in the females. Perianth segments 6 (very rarely 8) equal or nearly so, stamens of the outer series equal in number to the segments of the perianth all perfect with introrse anthers, of the inner series 3 generally perfect with extrorse anthers alternating with 3 short staminodia, anthers 4-celled or the inner ones rarely 2-celled, glands 6 at the base of the inner perfect stamens, ovary not immersed, berry seated on the somewhat enlarged truncate or 6-lobed perianth-tube, the segments of which are wholly or partially deciduous. Trees or shrubs, leaves opposite or alternate 3-or rarely 5-nerved, flowers in axillary panicles.

CINNAMOMUM ZEYLANICUM. (Breyn.) *var.* WIGHTII. (DC.) A very large tree up to great girth, the young branches rather acutely 4-angled and furrowed between, gemmæ fulvo-tomentose, leaves opposite sub-opposite or quite alternate, very hard and coriaceous elliptic to ovate more or less attenuated and sometimes unequal at the base, obtusely pointed at the apex, glabrous and shining above, glaucous beneath and (under the lens) very minutely puberulous on the veins, 3-5 inches long by 1½-3 inches broad, very minutely and beautifully reticulated and very prominently 3-5 nerved, the nerves often connate for some distance up from the base in a compressed vein 3 lines in breadth, (in the larger 5-nerved leaves), petiole very broad and flat 8-12 lines long, panicles from somewhat shorter to about as long as the leaves, minutely puberulous, the rachis very flat corymbosely-ramous towards the apex, ultimate divisions 3-flowered, flowers fulvo-tomentose about 3 lines long generally hermathrodite, the perianth rarely with 8 segments.—Cinnamomum Wightii, *DC. Prod.* xv. *p.* 11.

This exceedingly handsome variety of Cinnamon is very abundant on the higher ranges of the Nilgiris, and in all sholas about Ootacamund, flowering in May; all the parts when fresh if crushed have a powerful odour of Cinnamon; the timber is even grained and good, but is not much in use. We have some 7 for 8 well marked varieties of Cinnamon in our western (moist) forests from the sea level up to the highest elevations; they differ much in size and in the manner of growth of the tree itself, shape and size of the leaves, pubescence, &c., and may be all or most of them distinct as species; but after long observation and with a very large collection of specimens before me, I am inclined to look upon them all more as varieties only of the C. Zeylanicum than as entitled to specific distinction. Well marked as some extreme forms are, they run almost imperceptibly into one another, and it is almost impossible to lay hold of any constant character worthy of a specific distinction, and many of the differences are, I believe, the effect of elevation and climate. One variety common on the Sisparah ghat (Nilgiris) and in the Wynad about Manantoddy, has its leaves densely clothed on both sides or only beneath with dense yellow tomentum, it is I believe, the sulphuratum of Nees, but there are other forms exactly like it except that the tomentum is more or less absent.

Analysis.

1. A flower bud.
2. A flower.
3. Perianth opened showing the 6 outer stamens with their introrse 4-celled anthers (the inner stamens and staminodes removed.)
4. The 3 inner stamens, the anthers extrorse, filaments with 2 glands at the base, and the 3 staminodes.
5. Outside view of the same (both this fig. and No. 4 more highly magnified than No. 3.)
6. One of the outer row of stamens, inside view.
7. One of the 3 inner fertile stamens, inside view.
8. Staminodes, inside and outside view.
9. Ovary, style and stigma.
10. Ovary cut vertically, showing the solitary pendulous ovule.
11. Fruit. (All drawn from fresh specimens except No. 11 (fruit), which, in the absence of the fruit of this species, is taken from another variety, C. iners.)



rnde. del. Dunphy Lith.

Cinnamomum Zeylanicum. (var. Wightii D.C.)

BEILSCHMIEDIA FAGIFOLIA. (Nat. order Laurineæ.)

BEILSCHMIEDIA. *Nees.*—GEN. CHAR. Flowers hermathrodite or polygamous, calyx 6-parted, lobes subequal deciduous, stamens 9 fertile, anthers ovate oblong 2-celled the 6 exterior opposite the calyx lobes introrse, the 3 interior with the cells lateral subextrorse, opposite alternate lobes of the calyx and forming the 2nd series, staminodia 3 small ovoid or subsagittate very shortly stipitate forming the inner series, glands 3 or 6 stipitate between the 3 or the 2nd series of stamens, ovary 1-celled 1-ovuled (or incompletely 2-celled ? 3-ovuled ?) style filiform, stigma discoid obtuse, berry dry naked oblong seated on the persistent base of the calyx 1-celled (with the rudiment of the partial partition). Trees, leaves subopposite few penniveined venoso-reticulate, racemes imbricated with deciduous scales and springing from axillary gemmæ, scales 1-few flowered at length deciduous, flowers yellowish.

BEILSCHMIEDIA FAGIFOLIA. (Nees.) A very large tree, gemmæ and young leaves minutely puberulous, leaves few and subopposite coriaceous elliptic ovate or oblong rounded or attenuated at the base, obtusely pointed at the apex, glabrous on both sides and shining above, up to 6 inches long by 3 broad, petioles 6-9 lines long, racemes axillary pubescent about as long as the petiole imbricated with scales at the base, flowers, &c. as in the generic character, fruit (immature) oblong apiculate. *Nees in Wall. Pl. As. p.* 69 ;—*DC. Prod.* xv. 64.

I have only met with this fine tree in the dense moist forests in the plains of South Canara (Parapa near Sooleay), not much above the sea level, but it probably occurs in Malabar and elsewh ere in our western forests, and it has been found in North Canara and on the Silhet mountains in Northern India; the tree grows to an immense size, and the timber is said to be very good, and is used for building purposes.

Analysis.

1. A flower.
2. The same open.
3. Calyx (or perianth) opened showing the outer row of 6 stamens opposite the lobes with their anthers introrse and 2-celled, the inner row of 3 fertile stamens opposite the alternate lobes each furnished with 2 stipitate glands at the base, the anthers extrorse and 2-celled and the 3 staminodes or imperfect anthers quite similar to Cinnamomum except that the anthers are 2-celled instead of 4-celled.
4. An outer introrse stamen and an inner extrorse one with its 2 stipitate glands as seen opposite each alternate lobe of the perianth.
5. Ovary, style and stigma.
6. Ovary cut vertically 1 cell and 1 pendulous ovule. (DeCandolle describes the genus as having an imperfectly 2-celled ovary and 3 ovules, but I can find no trace of this in this species.)
7. Ovary cut vertically. (Drawn from specimens in spirit.)

[illegible] del. Dumphy lith

Beilschmiedia fagifolia, (Nees.)

MACHILUS MACRANTHA. (Nat. order Laurineæ.)

MACHILUS. *Rumph.*—GEN. CHAR. The same as Cinnamomum (vide Pl. cclxii) except that the perianth segments persist entirely around or under the fruit or berry without any enlargement or thickening of the pedicel, and that the glands of the inner fertile stamens are decidedly stipitate, one on each side of the base of the filament. Trees, with alternate leaves, veins pinnate, panicles terminal or becoming lateral by the elongation of the shoot.

MACHILUS MACRANTHA. (Nees.) A very large tree, leaves membranaceous when young but coriaceous in age, ovate or oblong to elliptic obtuse or acute at the apex glaucous beneath and finely reticulated, up to 8 inches long and 3 broad, petioles 1-1¾ inches long channelled on the upper side, panicles terminal hoary with a minute whitish pubescence about as long as the leaves and rather compact, or longer than the leaves and laxly branched, bracts lanceolate 3 lines long very early deciduous, branchlets cymose, flowers yellow hoary outside 4-6 lines in diameter, the calyx segments equal or sub-equal or the outer 3 smaller than the inner, berry depresso-globose 4-7 lines in diameter. *Nees in Wall. Pl. rar.* 2 *p.* 70, 3 *p.* 31 ;—*DC. Prod.* xv. *p.* 40. M. macrantha and glaucescens, *Wight's Icones plates* 1824-5.

This is a very handsome tree when in full blossom ; it is most abundant in all our western moist forests from Canara down to Travancore and Tinnevelly, and in Mysore and Coorg (very abundant), and from elevations of about 1000 *feet up to nearly* 6000 *; it is also found in the Bombay ghats and in Ceylon. On the Nilgiris (Coonoor) it is called Kromà by the Burghers, on the Anamallays Iruli by the Kaders, in S. Canara Koormà, and in Ceylon Ullalu ; the timber is often used for building purposes ; it is light and even grained, and would answer as a substitute for deal ; the tree flowers in March and April.*

Analysis.

1. A bud.
2. A flower, 3 outer segments of the perianth smaller than the 3 inner.
3. Perianth or calyx opened showing the arrangement of the 9 fertile stamens, the 6 glands and 3 staminodes (exactly the same as in Cinnamomum.)
4. One of the outer row of stamens, inside view, anthers introrse 4-celled.
5. One of the inner row of stamens with its 2 stipitate glands, inside view, anthers extrorse 4-celled.
6. Staminodes, front and back view.
7. Ovary, style and stigma.
8. Ovary cut vertically, 1 pendulous ovule.
9. Ripe fruit showing the persistent unaltered perianth segments below it, no enlargement of the pedicel.
10. Magnified portion of inflorescence.
11. A leaf natural size, showing the penniveined venation (very different to that of Cinnamomum.)—(All drawn from living specimens.)

Govindo del.   Dumphy Lith.

Machilus macrantha. (Nees.)

HUNTERIA ZEYLANICA. (Nat. order Apocyneæ.)

HUNTERIA. *Roxb.*—GEN. CHAR. Calyx 5-parted without glands, corol infuudibuliform, the jaws naked, lobes 5 convolute, stamens 5 inserted on the tube a little above the middle, anthers ovate acute included twice as long as the filaments; ovaries 2 ovoid each 1-celled with 2-4 ovules, style filiform, stigma ovoid short the apex bicuspidate, berries 2 distinct ovoid subpedicellate, 2-seeded or 1-seeded by abortion, pericarp coriaceous not thick, albumen copious, radicle cylindric superior, cotyledons foliaceous elliptic. Trees or shrubs, leaves opposite or verticelled in threes entire glabrous, cymes paniculate terminal or axillary, flowers small.

HUNTERIA ZEYLANICA. (Retz.) A small tree, leaves opposite lanceolate, or ovato-lanceolate, very glabrous bluntly-acuminate entire transversely ven ose, about 5 inches long by $1\frac{1}{2}$-2 broad, petioles 3-5 lines long, cymes axillary and terminal $2\frac{1}{2}$-3 inches long, flowers yellow about 9 lines long, carpels oblong 1-$1\frac{1}{2}$ inches long rostrato-acuminate stipitate.—Cameraria Zeylanica, *Retz. Obs.* 4. *p.* 24. Hunteria, *Thw. En. Pl. Zey. p.* 191.

This tree has only been detected in Ceylon, (if it is distinct from H. corymbosa, Roxb, to which it is certainly closely allied); it is common in the warmer parts of the island, and called by the natives Maddeya; the timber is very fine and close grained and very similar to Box-wood; it answers well for engraving.

Analysis.

1. A flower.
2. Corol opened.
3. Calyx, style and stigma,
4. Anthers, front and back view.
5. Ovary rather advauced.
6. The same cut transversely.
6*a*. The same cut vertically.
7. Fruit.
8. Oue carpel cut transversely.
9. A seed.
10. Embryo with its superior radicle. (The drawing and analysis were communicated by Dr. Thwaites.)

PL: CCLXV.

Dumphy Lith.

Hunteria zeylanica (Retz:)

ASTERIASTIGMA MACROCARPA. (Nat. order Bixineæ.)

ASTERIASTIGMA. *Bedd.*—GEN. CHAR. Calyx 4-parted much imbricate, petals 12 each furnished on the inside with a large scale, stamens numerous (60) in 2 rows inserted on to the torus between the scales and the ovary, anthers oblong opening longitudinally along the outer edge and polleniferous, ovary sessile, placentas 6-7, ovules very numerous, stigmas as many as the placentas large sessile spreading 2-lobed. Berry large globose, pericarp woody, seeds numerous (50), testa crustaceous, albumen fleshy, cotyledons large foliaceous ovate plane, radicle short thick inferior. A tree, subglabrous, leaves penniveined petioled entire, flowers rather fleshy in short fascicles on the older branches.

ASTERIASTIGMA MACROCARPA. (Bedd.) A large tree, young shoots minutely aureo-pubescent, leaves exactly oblong with a short sudden acute point at the apex, quite entire, above glabrous or the costa very minutely pubescent towards the base, beneath glabrous except the costa and primary veins (which are minutely strigose), and furnished with very minute white dots (under the lens) 10-12 inches long by 3½ broad, venation very prominent beneath, the primary veins much raised about 7 on each side alternate, veinlets parallel prominent with the venules prominent and beautifully reticulated, petioles 9-10 lines long pubescent, flowers whitish about 1 inch across in few flowered 1½ inch long fascicles on the older branches, pedicels 4-5 lines long thick, calyx segments roundish minutely puberulous or subglabrous, petals much shorter than the calyx-segments oblong much ciliate round the margin with broad scale-like hairs and each furnished on the inside near the base with a thick fleshy hairy more or less 3-lobed scale about ⅔ as long as the petal, filaments about as long as the petals dilated at the base filiform at the apex (rarely furnished with 2 anthers), ovules hairy, seed glabrous more or less angled (from pressure.)

I discovered this very fine tree last September (in young fruit) on the ghat (2500 feet elevation) leading up to Peermede (Travancore hills) from Cottyam, it flowers in March, and I received good specimens of the flowers in spirits, and ripe fruit, from which the drawing is taken. All the flowers sent were bisexual, the anthers being apparently polleniferous, but it is very possible that there may be male flowers in addition, and that the tree may be polygamo-diœcious or monœcious. The fruit and leaves (except that the latter are entire) are exactly those of Hydnocarpus, but I think it differs too much to authorize its being referred to that genus; it may however be co-generic with the little known Taraktogenos of Hasck. There was quite a clump of the trees at the place above mentioned.

Analysis.

1. A fascicle of flowers.
2. A bud.
3. A flower half open.
4. A flower fully open, calyx 4-leaved, petals 12 each with a scale, stamens 60 in 2 regular rows inserted on the torus, ovary with 6-7 large sessile spreading stigmas.
5. A petal shewing the margin ciliate with scales and the thick generally 3-lobed scale attached a little above its base.
6. A flower with most of the petals and stamens removed, to show the torus on which the stamens and petals are inserted.
7. The scale removed from the petal.
8. Shows the regular 2 rows in which the stamens are inserted, the scale has been removed from the petal in the back ground.
9. Anthers, front and back view.
10. A filament with 2 anthers (a few of these occurred in most flowers examined.)
11. Ovary cut vertically.
12. Ovary cut transversely shewing 6 parietal placentas, (this is the usual number, but when there are 7 styles there are 7 placentas) and numerous ovules.
13. An ovule shewing that it is hairy.
14. A fruit (life size) cut open to shew the numerous closely packed seeds.
15. A seed.
16. Vertical section of a seed, the testa removed, shewing the large embryo as it lies in the albumen.

Govindo del.

Dumphy Lith.

Asteriastigma macrocarpa, Bedd.

MYRISTICA LAURIFOLIA. (Nat. order Myristiceæ.)

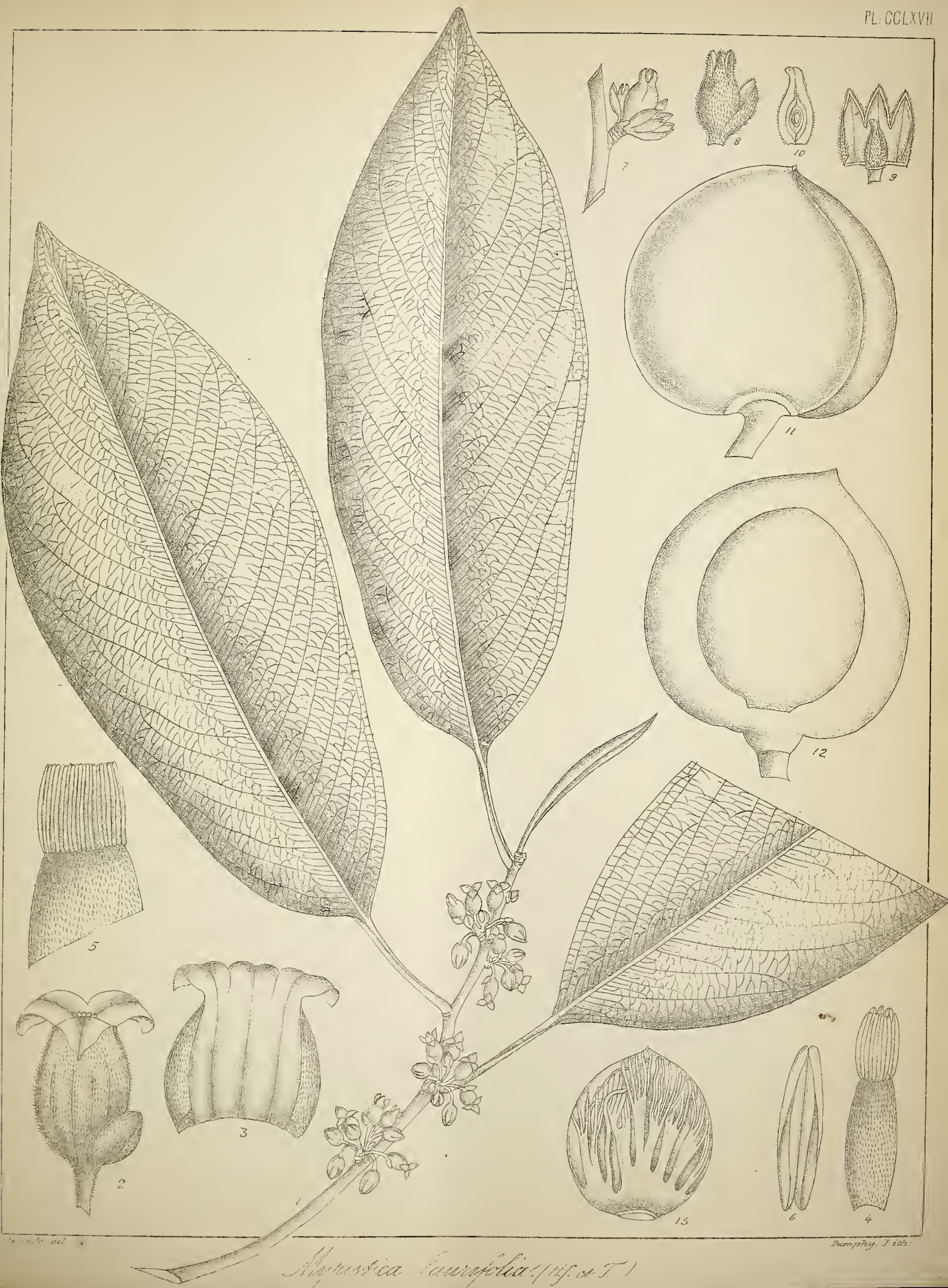
MYRISTICA, *Linn.*—GEN. CHAR. Flowers diæcious, regular, perianth deciduous, 2-4-generally 3-lobed coriaceous, valvate in æstivation. *Male,* stamens united in a central column, anthers 3-18 or more adnate to a central column at the apex or in a ring immediately below the column each with 2 parallel cells opening longitudinally. *Female,* ovary free within the perianth with a single erect anatropus ovule, stigma sessile or nearly so capitate or depressed. Fruit succulent opening tardily in 2 valves, seed erect sessile more or less covered with a lobed or jagged often scarlet arillus (or arillodium) proceeding from the base of the seed, albumen remarkably ruminate, embryo very small at the base of the seed with divaricate cotyledons. Trees, often aromatic, leaves alternate entire usually dotted penniveined without stipules, flowers small in axillary or supra-axillary racemes or panicles, more numerous in the males than in the females, bracts minute or none.—Knema, *Lour.* Pyrrhosa, *Blume.* Horsfieldia, *Willd.* Virola, *Aubl.* Sebophora, *Neck.*

MYRISTICA LAURIFOLIA. (H. F. et T.) A large handsome tree, young parts and under surface of young leaves ferrugineo-tomentose, leaves very coriaceous oval-elliptic or oblong scarcely acute, rounded or cuneate at the base, perfectly glabrous and shining above, glaucous but in age glabrous beneath, 5-10 inches long by 2¼-4 broad, primary veins 12-18 on each side impressed on the upper side, prominent and raised on the under side, running to the margin and there looped, intermediate parallel veins conspicuous but not prominent and not extending nearly to the margin, transverse veinlets not prominent, petioles 8-15 lines long channelled above, male flowers 6-15 together in short rather dense axillary clusters, the common peduncle (floriferous tubercle) sometimes 2 cleft very thick woody, 1-3 lines long, prominently marked with the cicatrices of the bracts, the pedicels rather slender 2-3 lines long ferrugineo-tomentose, perianth cylindrical about 3 lines long densely ferrugineo-tomentose on the outside very shortly 3-cleft at the apex with a broad ovate or nearly round ferrugineous bract adnate to its base, antheriferous column narrow to oblong ferrugineous included, not or very slightly and bluntly apiculate above the anthers, anthers 7-12 linear adnate round the upper 3rd of the column the lower ⅔ being naked; female flowers as in the male, only few generally 3-4 in the heads; ovary ferrugineo-tomentose, stigma oblique, fruit solitary or 2-3 together on very short thick axillary pedicels, from oblong to nearly globose more or less ferruginous according to age, 2½ inches long by 1½-2½ broad, seed conforming in shape to the fruit, the mace or aril nearly encircling the fruit, deeply cut down into 10-14 broad lobes, each of which is more or less lacerated at the apex into filiform segments. *Fl. Ind. Hook. fil. et T. p.* 163. M. Ceylanica, diospyrifolia, and laurifolia, *DC. Prod.* xiv. 190-191.

This is the commonest wild nutmeg in this Presidency, and it is to be found in all our western forests from scarcely any elevation up to 5000 *feet, and it is common in Ceylon; the drawing and description are taken entirely from a suite of specimens from our western forests, but a careful analysis of specimens collected in Ceylon show no difference whatever. The nutmeg and the mace are of no value. It is a very handsome tree but not to compare with what I figure as M. magnifica. I am not acquainted with the timber of this or any of the species of Myristica.*

Analysis.

1. Branch of male tree in flower, intermediate less developed parallel veins between the primary veins.
2. A male flower and its bract.
3. Perianth or calyx opened.
4. The antheriferous column slightly swollen and hairy, anthers extending down only ⅓ from the apex, a slight blunt apiculation visible above the anthers.
5. The same cut down one side and spread out, shewing 10 anthers present.
6. An anther.
7. Female inflorescence, flowers fewer than in the male.
8. A female flower (less magnified than number 2).
9. The same open, stigma oblique.
10. Vertical section of the ovary, 1-celled with an erect anatropous ovule.
11. Ripe fruit (it is sometimes oblong.)
12. One valve of the fruit after it has burst.
13. Seed and its aril (All drawn from living specimens).



Dumphy. lith.

Myristica laurifolia: (H.f. et T.)

MYRISTICA MAGNIFICA. (Nat. order Myristiceæ.)

For Gen. Char. see letter press to Pl. cclxvii.

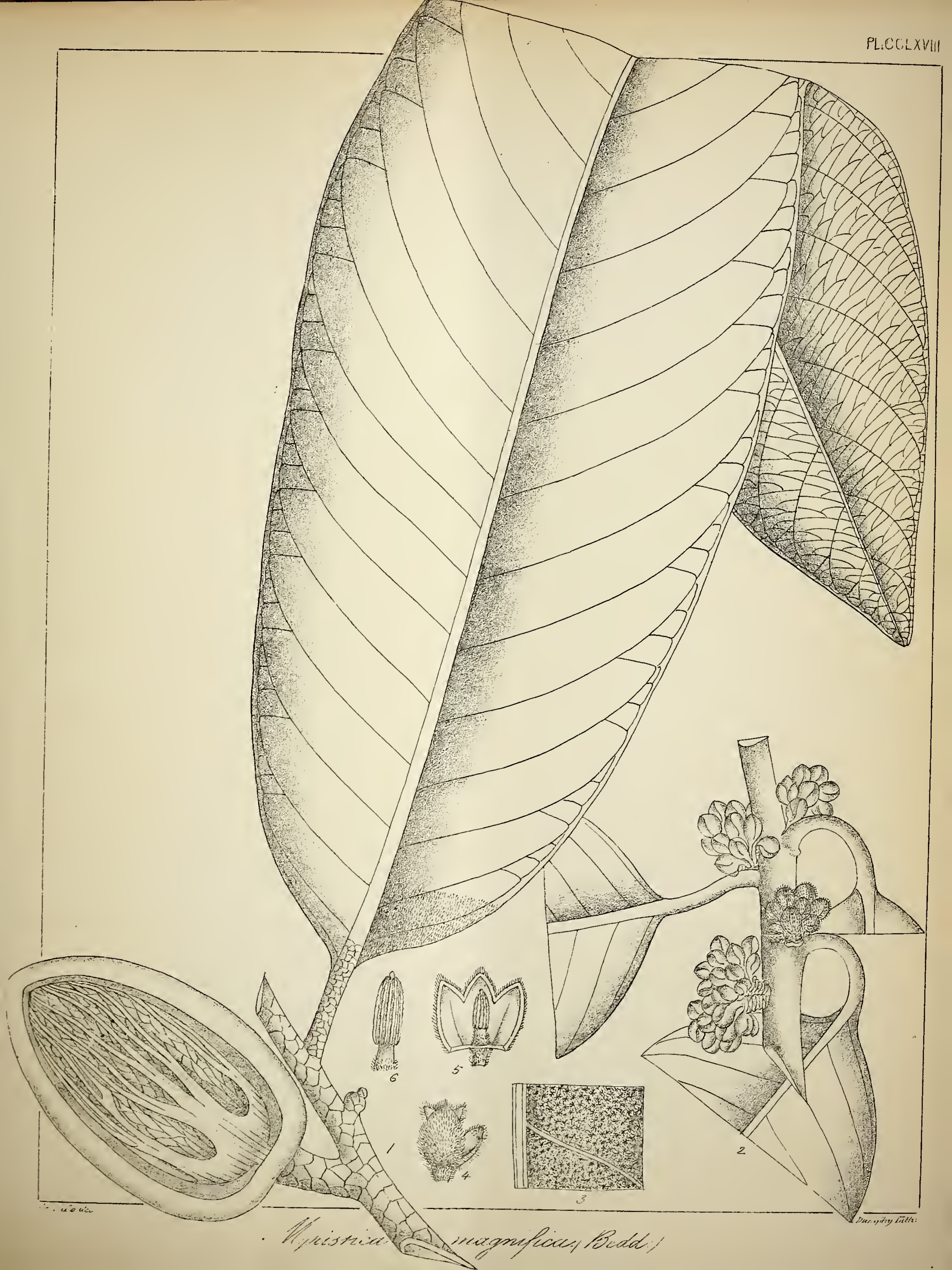
MYRISTICA MAGNIFICA. (Bedd.) An immense tree with a lofty straight trunk up to 90-100 feet and of great girth, in young trees large roots proceed from the lower 6-8 feet of the trunk, these increase with the growth of the tree and form very large buttresses in the older trees. Young parts clothed with reddish or golden tomentum, leaves very coriaceous oblong to elliptic acute or almost acuminate, in the older trees 10-15 inches long, but in young trees up to 2 feet long, above glabrous in age, beneath densely clothed with close set reddish-golden stellate tomentum, primary veins 20-26 on each side impressed above, very prominent and raised on the under surface and reaching nearly to the margin where they are looped, intermediate parallel veins wanting, transverse veinlets only visible on the upper side : petioles 3-14 lines long channelled on the upper side ; male flowers 8-20 together in short dense axillary clusters densely clothed with golden tomentum, the common peduncle or tubercle often 2-cleft very thick woody 1-8 lines long, pedicels thick scarcely a line long or altogether absent, perianth about 2 lines long subglobose or somewhat oblong short 3-cleft at the apex with an ovate bract adnate to its base, antheriferous column included not much swollen, hairy only at the base, slightly and bluntly apiculate above the anthers, anthers 8-10 covering nearly $\frac{3}{4}$ of the column ; female flowers not seen, fruit oblong solitary or 2 together in the axils on very thick short pedicels, 3-3$\frac{3}{4}$ inches long by 2 inches broad, hoary on the outside, mace or aril deeply cleft into a few broad divisions with these again much lacerated and covering the apex of the seed.

This is one of the most magnificent trees in the Presidency. Specimens only in leaf sent to Kew were pronounced to be the M. Malabarica, but the inflorescence is utterly at variance with the descriptions of that tree. This species I have only seen in South Travancore, where I met with it most abundant and gregarious (in fruit in August) in the dense moist forests quite in the plains not far from the foot of the ghats round about Mimootee near Colatoorpalay ; it is a most conspicuous and beautiful tree, and I do not think it could have escaped my observation if it inhabited Malabar or Canara. Every sapling was amply furnished with large roots proceeding from the base of the trunk up to 6 *or* 8 *feet from the ground, and these formed immense buttresses in the old trees, many of which were very much over* 100 *feet high with a perfectly erect trunk of* 80 *or* 90 *feet in length and of great girth. I have since (in February) received flowers, but unfortunately only male : it is most allied to M. laurifolia but a very different looking tree ; the leaves are very much larger with a different pubescence and venation, the antheriferous column is different and the fruit is much larger. I collected a great quantity of the fruit of this species, and they were all exactly oblong and often nearly* 4 *inches long. The fruit of laurifolia varies from oblong to globose and does not, I think, exceed* 2½ *inches in length.*

Analysis.

1. A branch of the female tree, the fruit burst and one of the valves removed, to show the seed and aril, the primary veins on the leaf most prominent, no intermediate parallel less developed veins as in laurifolia.
2. A branch of the male tree in flower.
3. Under surface of a leaf shewing the densely matted stellate pubescence.
4. Male flower with its bract.
5. The same open.
6. The antheriferous column, $\frac{3}{4}$ covered with the anthers, the base hairy.

PL. CCLXVIII



Myristica magnifica, Bedd.

MYRISTICA MALABARICA. (Nat. order Myristiceæ.)

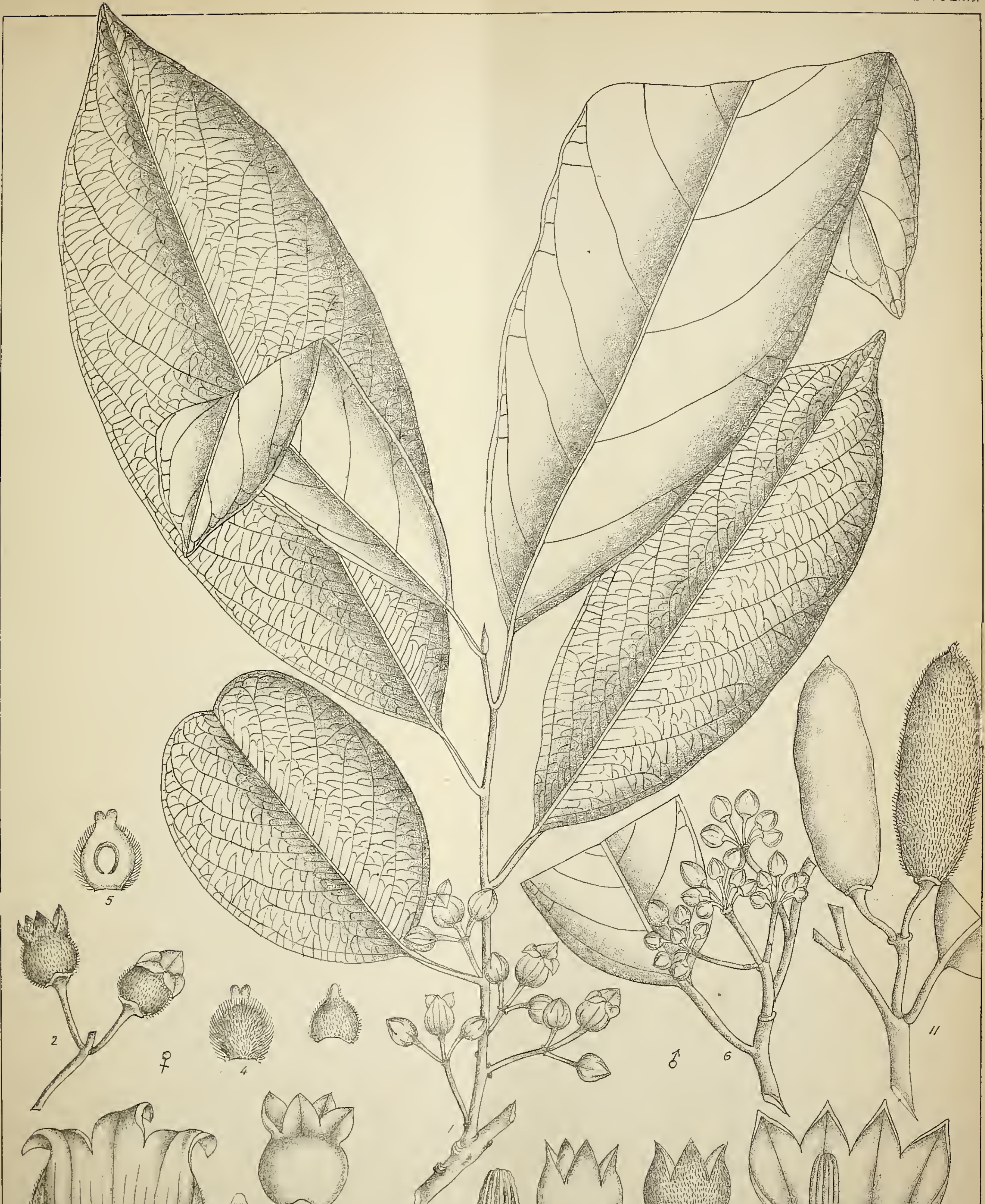
For Gen. Char. see letter-press to Pl. cclxvii.

MYRISTICA MALABARICA. (Lam.) A rather small very elegant tree, young parts very minutely puberulous, leaves elliptic-lanceolate, scarcely coriaceous, about equally attenuated at both ends, glabrous on both sides, dull colored above, dull brown or glaucous beneath, 4-8 inches long by $1\frac{1}{2}$-$2\frac{1}{4}$ broad, primary veins inconspicuous on both sides, petioles 6-12 lines long channelled above. *Male*, cymes axillary or from the old axils below the leaves 1-2 inches long generally cymosely branched, bi-trichotomous rarely simple, flowers much more numerous than in the female and smaller, umbelled at the apex of the branchlets, pedicels 2-6 lines long, perianth minutely puberulous or subglabrous, subglobose, 3-4-cleft at the apex, about 2 lines in length and breadth furnished on one side at the base with a semicircular sub 3-lobed bract which is very much broader than high, anthers 10-15 covering more than $\frac{3}{4}$ of the column, the short naked base very hairy, the column not at all or only slightly produced above the anthers. *Female,* peduncles axillary 4-8 lines long generally simple with 3 umbelled pedicels at the apex, rarely once branched and bearing 5-6 flowers, pedicels 3-4 lines long, perianth larger than in the male about 3 lines each way slightly puberulous 3-4 cleft and rather contracted just below the lobes, furnished with a similar bract to that in the male, ovary globose hairy, stigma 2-cleft glabrous, fruit oblong 2 inches long $\frac{1}{2}$ inch broad more or less pubescent. *Lam. Act. Paris.* 1788. *p.* 162 ;—*Flora Indica H. f. et T. p.* 163.

This very elegant tree is very common in the dense moist forests in the plains of South Canara and northern part of Malabar not far from the ghats, where it is well known by the Canarese name Kánagi, but I have not observed it further south ; it answers so well to the description of M. Malabarica in the Flora Indica, that I have no hesitation in referring it to that species, though specimens which I have forwarded to Kew were not identified ; at any rate the description of that species in the Flora Indica cannot be referred to any other of our 5 *indigenous species, all of which I figure. I have received specimens of this tree from Mr. Dalzell from the Concan forests (labelled M. attenuata, which species however belongs to the section Knema.)*

Analysis.

1. A branch of the female tree in flower (life size) shewing the 3-flowered umbelliferous peduncles (they are rarely once branched with 5-6 flowers.)
2. Three and four-cleft female flowers, shewing the broad sub 3-lobed bract half surrounding the base of the perianth.
3. A 3-cleft perianth opened.
4. The globose hairy ovary and stigma.
5. The same cut vertically.
6. Branch of a male tree in flower (life size) shewing the more compound inflorescence, the flowers smaller than in the female.
7. A 3-cleft female flower.
8. A 4-cleft female flower.
9. The same open.
10. The antheriferous column almost entirely covered by the anthers, the very short naked base very hairy.
11. Fruit. (Drawn from flowers in spirits.)



Govindo del.

Dunphy Lith.

Myristica Malabarica (Lam:)

MYRISTICA FARQUHARIANA. (Nat. order Myristiceæ.)

For Gen. Char. see letter-press to Pl. cclxvii.

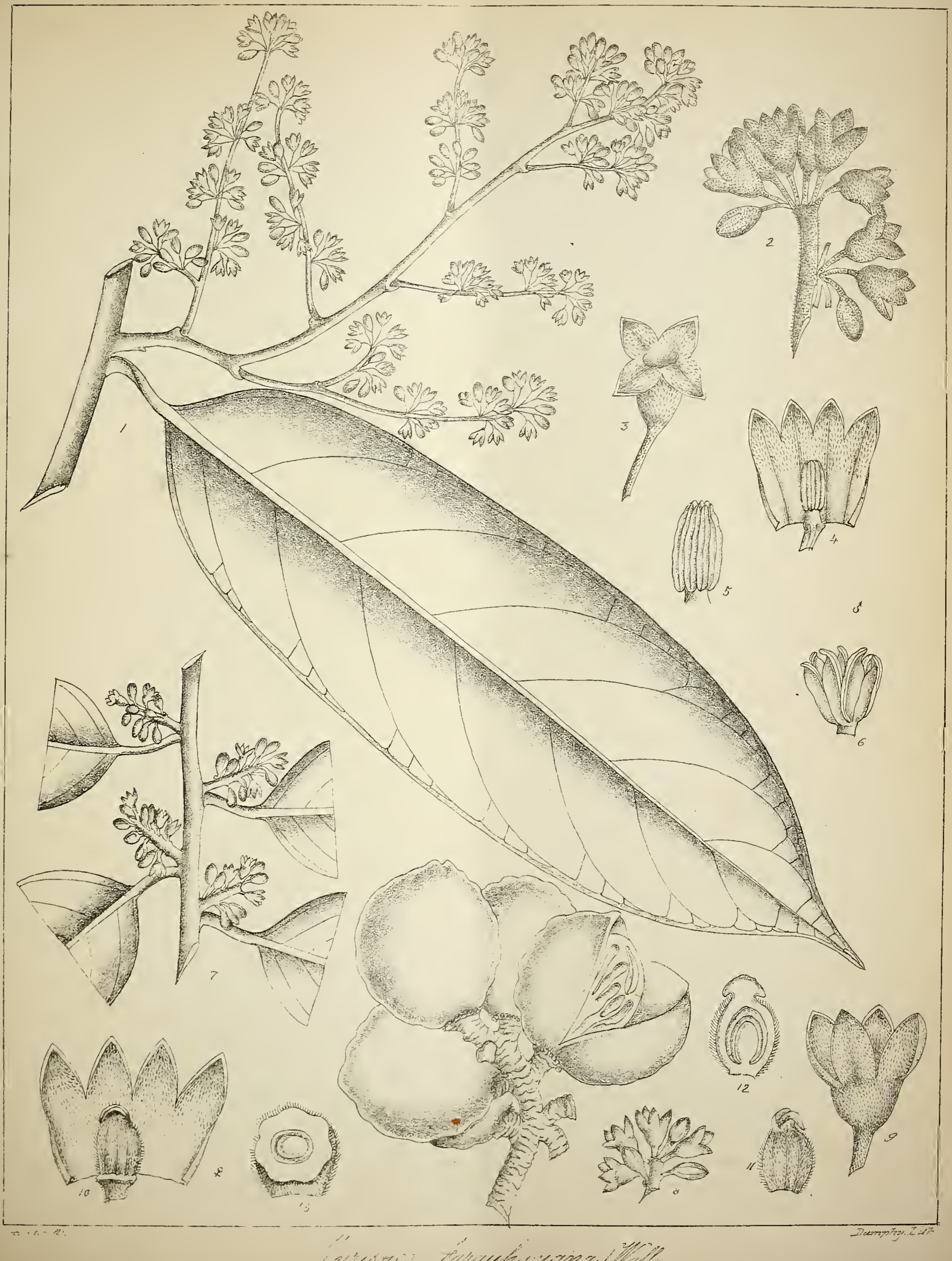
MYRISTICA FARQUHARIANA. (Wall.) A very handsome middling sized tree, trunk erect, branches regularly verticellate and quite at right angles, young parts minutely rufo-pubescent, leaves coriaceous oblong with an abrupt fine acumination or more or less gradually acuminate, generally quite rounded at the base, glabrous and rather shining above, very glaucous but quite glabrous (in age) beneath, $5\frac{1}{2}$ to 12 inches long by $1\frac{3}{4}$-$4\frac{3}{4}$ broad, primary veins 10-14 on each side inconspicuous above and not sunken, prominent beneath, intermediate parallel veins very incomplete but generally more or less visible on the under side, petioles 4-9 lines long, channelled on the upper side. *Male,* flowers very numerous in axillary much branched rufo-pubescent panicles, pedicels 2-3 lines long 6-10 together in clusters along the branch of the panicle with or without a short peduncle, and in the former case quite umbellate, perianth shorter than the pedicel 3-4 (generally 4) cleft pubescent on the outside and inside on its upper half, antheriferous column scarcely $\frac{1}{2}$ a line long glabrous not continued up between the anthers, anthers 7-11 (generally 7-8) produced back into a flat connective and all adnate into an oblong cone (but without any column between them) not much more than $\frac{1}{2}$ as long as the perianth; *female,* flowers 6-10 on short axillary rufo-pubescent racemes scarcely longer than the petioles, pedicels short thick or almost obsolete arranged along the whole of the peduncle, ovary very hairy, stigma large semilunate deeply bifid glabrous and fleshy, fruit quite globose 1-$1\frac{1}{4}$ inches in diameter glabrous in age. *Wall. cat.* 6798, and *Hook. & T. Fl. Ind. p.* 161. *in part.*

This tree is very abundant in the dense moist forests in the plains of S. Canara, where it is called Pindee; it also ascends the S. Canara and Coorg ghats up to an elevation of 1500 *or* 2000 *feet, and I have also found it on the Tambercherry ghat in the Wynad, but I have not observed it further south. I know nothing of its timber or uses.*

Analysis.

1. Branch of the male tree in flower, showing the loose panicle (life size.)
2. Highly magnified portion of the panicle, perianths 4-3-cleft.
3. A male flower, perianth 4-cleft.
4. The same open.
5. Anthers shewing the very short column at the base.
6. The same in a more advanced stage, and the anthers slightly separated to show that they have incurved points and a thin membranaceous connective down their inner face, and that the column is not produced up between them.
7. Branch of female tree in flower, showing the short axillary racemes (life size.)
8. Portion of a raceme magnified.
9. A 4-cleft female flower.
10. The same open.
11. Ovary and 2 cleft lunate fleshy glabrous stigma.
12. Ovary cut vertically.
13. The same cut transversely.
14. Branch of ripe fruit, one of them burst, showing the seed and mace or aril. (All drawn from flowers in spirits.)

Pl. CCLXX



Dunphy Lith.

[illegible] Farquhariana, Wall.

MYRISTICA CORTICOSA. (Nat. order Myristiceæ.)

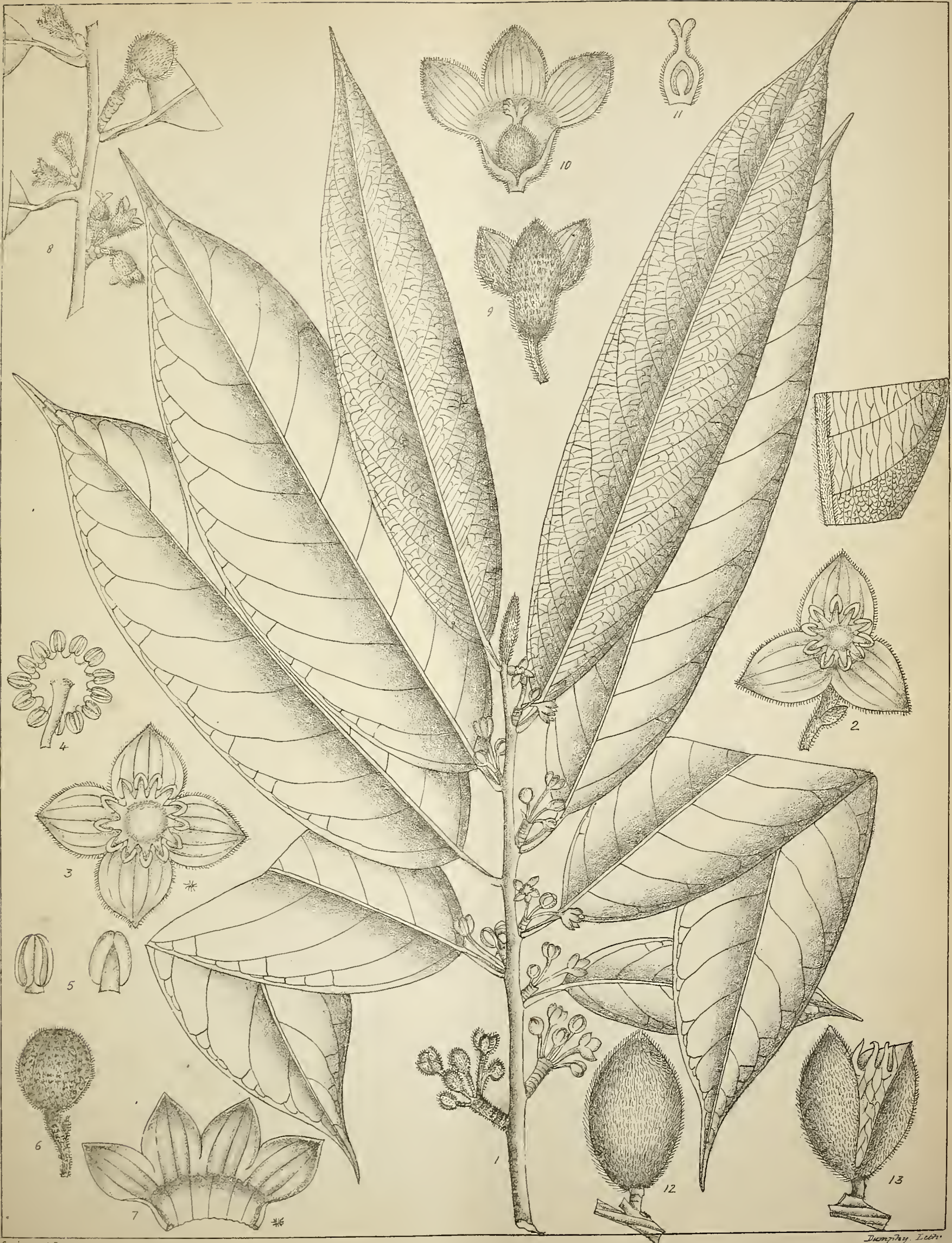
For Gen. Char. see letter-press to Pl. cclxvii.

MYRISTICA CORTICOSA. (Lour.) A very large erect handsome tree, young parts more or less downy often with a very dense close set golden tomentum, leaves from membranaceous to coriaceous, glabrous above in age, glabrous and very glaucous beneath or occasionally more or less aureo or rufo-pubescent especially on the costa, narrow-lanceolate to broad-lanceolate or rarely oblong or ovate, acute or with a long tapering point or sometimes obtuse, 4-8 inches long by 1-3 broad, 16-20 primary veins on each side prominent beneath, and somewhat conspicuous above but not impressed, intermediate parallel incomplete veins present or absent, veinlets transversely reticulated conspicuous beneath, petioles 4-6 lines long channelled on the upper side, peduncles in both sexes axillary or from the old axils, 1-4 lines long, 1-6 flowered in the male 1-3 flowered in the female, pedicels 2-4 lines long rather more slender in the male than in the female bracteated above the middle and with the perianth densely aureo or rufo-tomentose, perianth-lobes rather deep, veined, tube larger in the female, 3-4 parted. *Male*, antheriferous column dilated at its apex into a circular 11-13 toothed disk, on each tooth of which an anther is inserted on the underside ; *female*, ovary oval hairy, stigma large 2 lobed, lobes somewhat lacerated, fruit oval densely downy about 1½ inch long by ¾ inch broad.—Knema corticosa, *Lour. Fl. Coch.* 742. Myristica globularia, *Lam.* M. glauca, *Bl. Bidj.* 576 ;—*Rumph.* 1. 182 *t.* 60. M. lanceolaria, *Wall. cat.* 6742. M. missionis, *Wall. cat.* 6788. M. angustifolia, *Roxb. Fl. Ind.* iii. 847.

A lofty very handsome tree, common in all our western moist forests up to 3000 *feet elevation, from South Canara down to South Trvancore, very abundant about the foot of the Nilgiris west side (near Nellicootah), and about the Tinnevelly ghats. Some of my S. Canara specimens have the leaves quite ovate* 5 *inches long by* 3 *broad, but other forms run gradually into the narrow lanceolate shape which is most common ; the tree is also found in Birmah, from which country I have specimens quite corresponding to our Indian ones, and it inhabits the east part of Bengal, the Malay Peninsula, Java, Borneo and Cochin China.*

Analysis.

1. A branch of male tree in flower (sometimes the leaves are very much broader and in rare cases they are ovate.)
2. A 3-cleft male flower with an 11-cleft antheriferous disk, lobes of the perianth with nerves, densely stellato-pubescent on the outside.
3. A 4-cleft male flower antheriferous disk 13-lobed.
4. Underneath view of the antheriferous-disk and its column shewing that the anthers are placed, underneath the teeth of the disk dehiscing downwards.
5. Anthers, upper and underneath view, the tooth of the disk being the connective.
6. A male flower bud.
7. A 4-cleft male perianth cut open, shewing its tube shorter than in the female.
8. Branch of female tree in flower.
9. A 3-cleft female flower tube longer than in the male.
10. The same cut open, hairy ovary and bifid somewhat lacerated stigma.
11. Ovary cut vertically.
12. Fruit.
13. The same burst, shewing the seed and its aril. (Drawn from living specimens.)



Gravinus del. Dunphy. Lith.

Myristica corticosa. (Lour.)

CLEIDION JAVANICUM. (Nat. order Euphorbiaceæ.)

CLEIDION. *Blume.*—GEN. CHAR. Diæcious. Calyx 3-5 parted ; in the male valvate, in the female imbricate, petals none, disk none or sometimes present in the female. *Male,* stamens indefinite inserted on to a conical receptacle arranged in many verticels, filaments free attached to the centre of the anthers, connective often produced beyond the cells, anther cells dehiscing transversely, rudiment of ovary none ; *female,* ovary 2-3-celled, cells 1-ovuled, ovules pendulous, styles 2-3 each with 2 long filiform papillose stigmas. Capsule 2-3-coccous, seeds exarillate globose ; cotyledons much longer than the radicle, cordate at the base. Trees or shrubs, leaves alternate, toothed penninerved, stipules soon caducous, male flowers axillary glomerate in interrupted spikes or racemose or panicled, female flowers axillary, solitary or loosely racemose. *Bl. Bijdr. p.* 612 ;—*DC. Prod.* xv. *p.* 983. Redia, *Casaretto.* Psilostachys, *Turcz.* Lasiostyles, *Presl.* Tetraglossa, *Bedd. in Mad. Lit. Journ.*

CLEIDION JAVANICUM. (Bl.) A middling sized glabrous tree, young shoots very minutely puberulous, leaves glabrous and generally shining above, rather coriaceous, from narrow lanceolate or elliptic-lanceolate to broad lanceolate, sub acute at the apex or with a short rather abrupt obtuse acumination, distantly serrated the serratures callous, sometimes furnished at the base on the upper side with 2 hollow glands one on each side of the costa, 4-7 inches long by $1\frac{1}{2}$-3 inches broad, petioles 1-$1\frac{1}{2}$ inches long deeply channelled on the upper side, stipules ovate acuminate small deciduous. *Male,* racemes axillary slender from shorter to about as long as the leaves, flowers in small clusters of 3 to 8 together arranged along the common peduncle about 4 lines apart, pedicels 2-3 lines long bracteoled at the base, calyx $1\frac{1}{2}$ lines long 3-parted slightly pubescent, the connective of the anthers produced beyond the cells ; *female,* flowers solitary, peduncles bracteated, 6-12 lines long elongating as the fruit swells to 2-3 inches long, calyx 5 parted ciliate, ovary 2-3 lobed, 2-3 celled, ovules solitary in the cells pendulous, styles 2-3 united at the base into a single column branching upwards and each furnished with 2 long papillose stigmas, the whole 6-8 lines long but elongating to more than 1 inch as the fruit advances, capsules generally 2 lobed about 8 lines in diameter, cocci hard. *Bl. Bidj. p.* 613. Lasiostyles salicifolia, *Presl. Bot. Bemerk. p.* 149. Rottlera urandra, *Dalz. Bombay Flora p.* 230.

This tree is common in the moist forests on the Anamallays (Anagoody shola and elsewhere) elevation 2000-3000 *feet, Travancore moist forests below ghats, and elsewhere in our western forests, and is also found on the Bombay ghats, in Ceylon, Bengal, Birma, Java, &c. ; the timber is said by the natives to be hard and good for building purposes. The female flowers have often* 3 *styles and* 3 *cells to the ovary.*

Analysis.

The Figure represents a branch of the male tree in flower.

1. Male flower buds, calyx valvate.
2, 3. Full male flowers, showing the 3-parted calyx and the numerous stamens seated on a conical receptacle.
4. Anthers, front and back view, dehiscence transverse.
5. Portion of a branch from a female tree in flower, peduncle solitary axillary 1-flowered furnished with bracts.
6. A 2-styled flower more advanced, peduncle shortened.
7. A 3-styled flower still more advanced, peduncle shortened.
8. Female calyx, 5-parted imbricate.
9. A stigma, much magnified.
10. Ovary cut vertically, ovules pendulous.
11. A 2-celled ovary cut transversely, cells 2-ovuled.
12. A 3-celled ovary cut transversely.
13. Young fruit.
14. Ripe fruit cut transversely showing the embryo.
15. An embryo removed. (All drawn from living specimens.)

Clidion Javanicum, Bl.

TRIGONOSTEMON LAWIANUS. (Nat. order Euphorbiaceæ.)

TRIGONOSTEMON. *Blume.*—GEN. CHAR.: Monœcious, calyx of both sexes imbricate, in the female sometimes increasing in size with the fruit, petals alternate with the calyx-segments generally present in both sexes or rarely wanting in the female; disk present or rarely wanting. *Male*, stamens various in number in 1-3 verticels on a central receptacle which is not raised, anthers 2 celled dehiscing longitudinally extrorse or introrse, rudiment of ovary none. *Female*, ovary 3-celled, cells 1 ovuled, styles 3 connate at the base various in length, bifid or rarely twice bifid. Fruit capsular with 3 cocci, seed exarillate. Trees or shrubs, leaves alternate bistipulate penninerved lanceolate serrulate or entire, inflorescence axillary. *Bl. Bijd.* 600;—*DC. Prod.* xv. 1105. Silvœa, *Hook. et Arn.* Dimorphocalyx, *Thw.* Tritaxis, *Baill.* Telogyne, *Baill.* Athroisma, *Griff.* Cluytiæ, Sp., *Roxb.* Agyneiæ, Sp., *Wall.* Crotonis, Sp., *Wall and Nimmo.*

Section I, DIMORPHOCALYX, *Thw.—Male calyx shortly 5 toothed, female 5-parted increasing in fruit, petals and disk present in male and female; stamens about* 10 14 *in* 2-3 *verticels, anthers introrse, filaments more or less connate.*

TRIGONOSTEMON LAWIANUS. (Nimmo.) A small or middling sized much branched glabrous tree, (sometimes only a shrub,) leaves submembranaceous, lanceolate or ovate, sparingly glanduloso-punctate at the margins, or inconspicuously crenated or quite entire, 1-6 inches long by $1\frac{1}{2}$-$2\frac{1}{4}$ broad, petioles 4-12 lines long, stipules triangular from a broad base rather persistent, cymes few flowered terminal and axillary sessile or shortly pedunculate or rarely slender and lax, pedicels 1-6 lines long, flowers generally all of one sex, bracts small. *Male*, calyx cupuliform shortly 5-toothed or undulated, petals 5 erect reflexed at the apex white in color, disk dilated into 5 glands alternate with the petals, stamens 10-14 in 2 or 3 series, filaments more or less connate free upwards. *Female*, calyx large submembranaceous deeply 5-parted increasing with the fruit, petals as in the male, disk annular and less developed, ovary hairy, styles 3, stigmas bifid reflexed, capsule about 5 lines in diameter.—Croton Lawianus, *Nimmo in App. to Graham's Bot. of Bombay.* Dimorphocalyx glabellus, *Thw. and Bedd. Linn. Trans. vol.* xxv. *tab.* 26.

A very common tree in our dense moist western forests from Canara down to S. Travancore, up to 3500 *feet elevation on the Bombay ghats and in Ceylon. I know nothing of its timber; it is generally a middling sized tree, but sometimes flowering only as a shrub; in Ceylon it is called Welle wenne.*

Analysis.

1. A branch with female flowers.
2. A female flower.
3. A petal.
4. Ovary, styles and annular disk.
5. Ovary cut vertically, ovules attached to centre of axis.
6. Ovary cut transversely 3 cells, each 1 ovuled.

7, 8. Young fruit, calyx increasing in size.

9. A branch with male flowers.
10. A male flower.
11. Petals.
12. A male flower petals removed, showing calyx, 5-lobed disk and stamens sub 3-verticelled, the filaments connate below free above.
13. A stamen, anthers introrse.

14, 15. An abnormal male flower and its stamens.

Dunphy del

Trigonostemon Lawrianus. (Nimmo.)

OSTODES ZEYLANICA. (Nat. order Euphorbiaceæ.)

OSTODES. *Blume.*—GEN. CHAR. Diæcious, calyx of the male and female much imbricate, segments 5-6; petals present in both sexes imbricate alternate with the calycine segments and with the glands or lobes of the disk. *Male*, stamens more or less numerous central on a convex receptacle, filaments sub-connate, anthers 2 celled dehiscing longitudinally introrse or extrorse, no rudiment of an ovary. *Female*, ovary 3 celled, cells 1 ovuled, styles 3 very short, stigmas bifid or simple, fruit a woody capsule with 2-3 cocci, seed exarillate. Trees, leaves alternate with stipules, penniveined denticulate or entire coriaceous, flowers panicled or rarely fasciculate in the axils. *Bl. Bidj. p.* 619. Desmostemon, *Thw. En. Pl. Zey, p.* 278.

OSTODES ZEYLANICA. (Thw.) A very large tree, ramuli angled, young parts leprous, leaves coriaceous oblongo-lanceolate acute or acuminate very coarsely and distantly serrate glabrous in age, 8-18 inches long by $2\frac{1}{2}$-4 broad, petioles 2-$3\frac{1}{2}$ inches long tumid at the apex and furnished with 2 minute glands, stipules minute glandular on the inside, panicles terminal often much elongate and longer than the leaves pendulous, the rachis much angled more compound in the male, flowers more or less glomerate on pedicels 2 3 lines long, calyx deeply 5-parted slightly puberulous on the outside, segments unequal $1\frac{1}{2}$-2 lines long obtuse thick and generally with a knob on the outside, petals 5 erect imbricate reflexed at the apex white about 4 lines long. *Male*, disk large dilated into 5 fleshy glands, stamens about 15 sub-3-4-serial, filaments free or slightly cohering, anthers fixed by the middle of the back extrorse, cells parallel and dehiscing longitudinally. *Female*, disk annular and not as much dilated as in the male, ovary ovoid tomentose, 3-celled, cells 1 ovuled, ovules attached to the centre of axis, styles 3 very short, stigmas bifid small, capsule subspherical 1-$1\frac{1}{2}$ inches in diameter somewhat 5 ribbed slightly pubescent, seed oblong.—Desmostemon Zeylanicus, *Thw. En. Pl. Zey. p.* 278. Ostodes, *DC. Prod.* xv. *p.* 1114.

✕ — Vary. *β. minor*, a small tree differing in no way except that all its parts are smaller. Ostodes minor, *Mull. DC. l. c. page* 1115.

This tree is common in the dense moist forests of the Wynad, Anamallays, Tinnevelly ghats, Travancore and Ceylon, up to about 4000 feet elevation. I know nothing of its timber but it is in use for ordinary work in Ceylon, where it is called Walkakoona. Variety β is much rarer than the ordinary form, and I have only observed it on the Anamallays, and it occurs in Ceylon, it differs in no way except in the size of all its parts, but it is considered a distinct species by Muller.

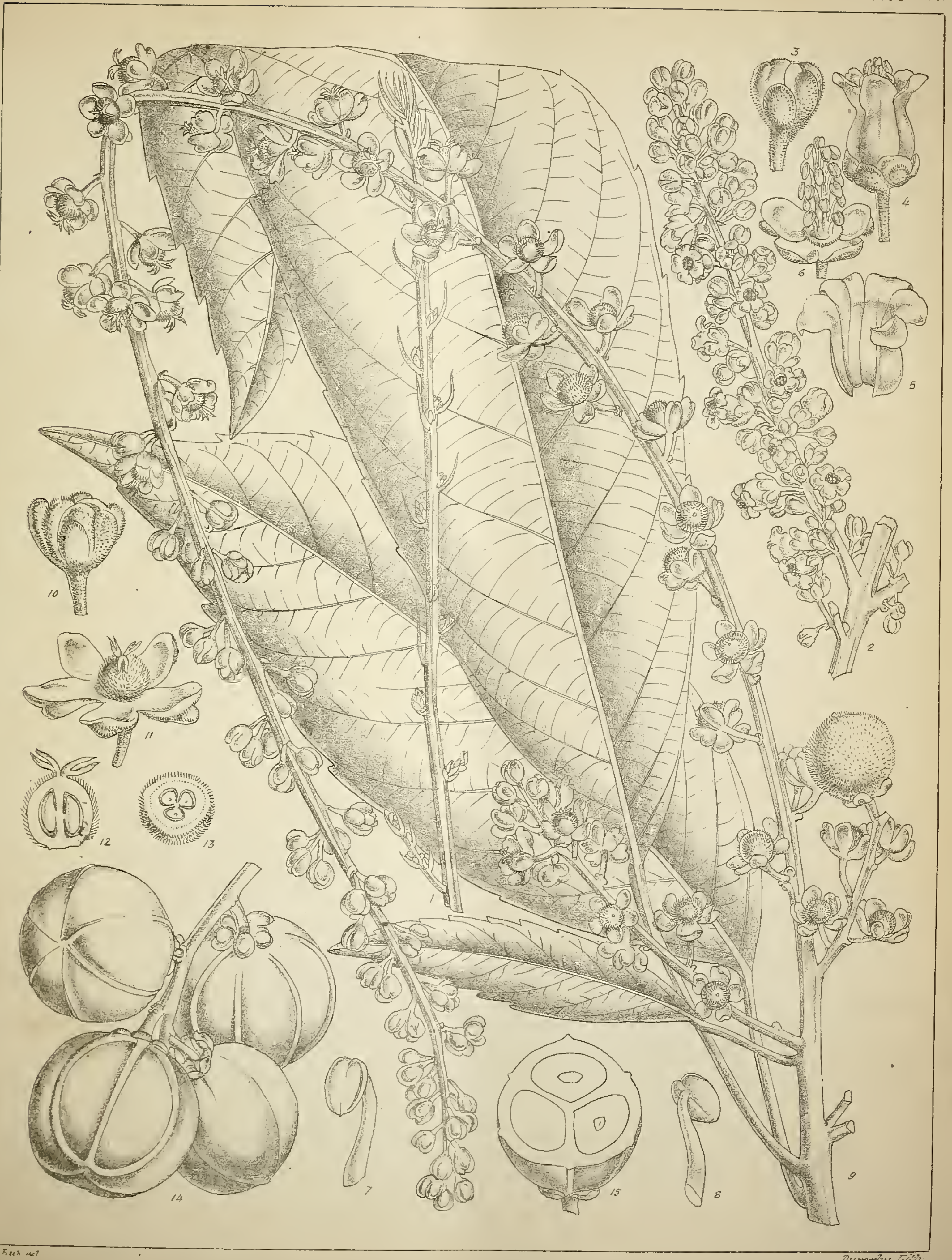
Analysis.

1. Portion of a male panicle in very young bud showing the much angled rachis.
2. Portion of a male panicle in flower,
3. A male flower bud.
4. A male flower.
5. The petals.
6. Calyx stamens and disk.

7,8. Anthers, front and back view.

9. Branch of the female tree in leaf, flower and young fruit.
10. Female flower bud.
11. Female flower open petals removed (the latter are similar to those in the male) shewing the hairy ovary and 3 short styles with their bifid stigmas.
12. Ovary cut vertically, ovules attached to centre of axis.
13. Ovary cut transversely 3-celled, cells 1-ovuled.
14. Ripe capsules.
15. A capsule cut transversely.

✕ Benth. in Lin. Jl. 17. p 225 says that this is identical with Trigonostemon zeylanicus, Müller Arg. Bed. Sm ... 212.—



W. Fitch del. Dumphy Lith.

Ostodes Zeylanica! (Thw:)

PUTRANJIVA ROXBURGHII. (Nat. order Euphorbiaceæ.)

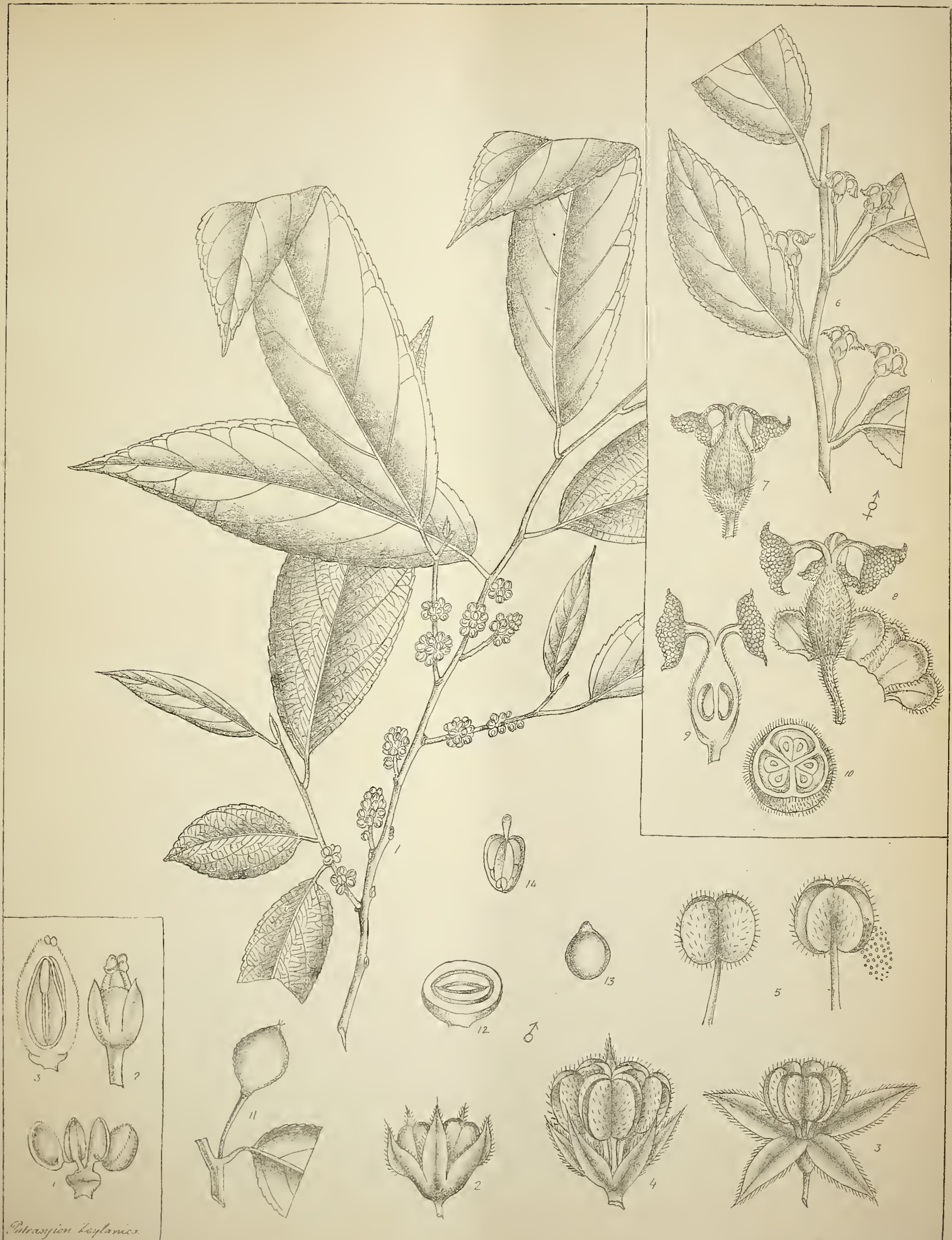
PUTRANJIVA, *Wall.*—GEN. CHAR. Diæcious. Calyx segments slightly imbricate, petals none, disk none, *Male,* calyx 2-5 parted, stamens 2-3 central free monadelphous or diadelphous, anthers 2-3 subglobse dehiscing longitudinally down the outer rim, rudiment of ovary none; *female,* calyx 4-6 parted, ovary 2-3 celled, cells 2-ovuled, styles 2-3, stigmas various often much dilated and papillose, fruit an obovate or oval drupe 1-celled (by abortion) nut hard 1 seeded, seed albuminous, cotyledons oval plane palmate-nerved, radicle short superior. Trees with hard timber, leaves alternate penniveined, more or less serrated, with very deciduous stipules, inflorescence axillary, male flowers collected in small globular heads, female flowers on long peduncles solitary or few. *Wall. Tent. Fl. Nepal. p.* 61. Nageia, *Roxb.* Palenga, *Thw.* Pongalam, *Rheede.*

PUTRANJIVA ROXBURGHII. (Wall.) A large timber tree, young parts minutely pubescent, leaves from membranous when young to coriaceous in age elliptic to narrow-oblong oblique at the base, sub-acute or obtuse at the apex and often with a mucro, from sharply serrulate to bluntly crenate, glabrous in age or slightly hairy beneath, shining above, and a little waved at the margins, 3-4 inches long by 1-1½ broad, petioles 3-4 lines long, stipules small villous soon deciduous; *male,* flowers sessile or subsessile numerous minute (scarcely a line long) yellowish collected in small globular heads in the axils or on short axillary spikes, calyx deeply 5-parted, segments ciliate and often hairy lanceolate acute or sometimes obtuse, filaments 1-2-3, when 1 trifid, when 2 one is bifid, anthers exserted always 3 globose hairy; *female,* flowers solitary or 2 together in the axils of the leaves, or in small simple few flowered racemes from the year old shoots, peduncles 8-12 lines long, flowers greenish larger than in the male, calyx 5-parted, segments ciliate and hairy more obtuse than in the male, ovary villous 3-celled, ovules pendulous from the apex of the axis, styles 3 recurved, stigmas very large and papillose sub-crescent-shaped or triangular, fruit oval ovoid to obovate or globose often more or less pointed at the apex, 7-10 lines long by 5-8 in diameter, hoary with a close set tomentum. Nageia Putranjiva, *Roxb. Fl. Ind.* iii. 766. P. Roxburghii et sphærocarpa, *DC. Prod.* xv. *p.* 443.

This fine timber tree is found, though sparingly, throughout the Presidency, where I have seen it most common is on the North Arcot hills 1000-1500 *feet elevation, and on our eastern mountains at* 2000-3000 *feet, but I have also found it in Malabar, and it occurs in Ceylon and Bengal; the fruit varies in shape and size and the leaves in texture. The timber is white close-grained, very hard and durable, and in use in some parts with the natives, but appears to be very little known, and should receive attention; it is well adapted for the lathe; the nuts are threaded by the natives as necklaces for children, and are supposed to keep them in good health. The tree is called Kudrajuvi in Teligu, and Puta-jan in Hindoostani, and Karupale in Tamil.*

Analysis.

1. Branch of the male tree in flower.
2, 3, 4. Male flower, calyx 5 parted imbricate when in bud, filaments generally 3 separate, stigma 1 trifid, or 2 one of them bifid, anthers always 3.
5. Anthers, front and back view. (All drawn from fresh specimens. North Arcot.)
6. Branch of female tree in flower.
7, 8. Female flowers.
9. Ovary cut vertically pendulous ovules.
10. Ovary cut transversely, 3 cells each 2-ovuled.
11. Fruit.
12. The same cut transversely.
13. The nut.
14. Embryo with its superior radicle. (All except the fruit copied from Dr. Wight's Icones,



Putranjiva Roxburghii (Wall.)

ALEURITES MOLUCCANA. (Nat. order Euphorbiaceæ.)

ALEURITES. *Forst.*—GEN. CHAR. Monæcious. Calyx of both male and female flowers splitting rather irregularly into 2-3 valvate segments, petals both male and female 5 contorted in æstivation. *Male,* stamens 7-22 inserted in 2-4 verticels on an erect naked column, anthers introrse or rarely extrorse dehiscing longitudinally, disk urceolate, its 5 glandular lobes alternate with the petals, or with 10 lobes, rudiment of ovary none. *Female,* disk of 5 glands free, alternate with the petals, ovary 2-5 celled, cells 1-ovuled, ovules pendulous, styles as many as the cells of the ovary bifid to almost the base, fruit a large fleshy drupe with 1-2 hard bony nuts, albumen oleaginous, embryo straight the cotyledons orbicular-ovate palminerved membranaceous, radicle very short. Trees, often with stellate pubescence, leaves alternate long petioled cordate or lobed entire or serrate often biglandulose at the base, flowers in terminal panicles. *Forst. Char, Gen. n.* 56 *c. ic.* 1,776. Camirium, *Rumph.* Dryandra, *Thunb.* Vermicia, *Lour.* Telopea, *Soland.* Ambinux, *Commerson.*

ALEURITES MOLUCCANA. Willd.) A large tree, trunk generally erect, bark smooth olive-colored, branches numerous, young shoots covered with much stellate pubescence, leaves about the ends of the branchlets lanceolate or rhomboid ovate to cordate on the large trees, often 3-5 lobed on saplings, margins often scollop-toothed, stellately pubescent when young, in age more glabrous but more or less silvery beneath, 4-8 inches long by 3-6 broad furnished with 2 large glands at the insertion of the petiole, petioles round about as long as the leaves, panicles terminal erect much shorter than the leaves clothed with stellate pubescence, flowers numerous small white, bracts subulate soon deciduous. *Male,* flowers terminal about 3 lines long most numerous, calyx stellately pubescent splitting irregularly into 2 segments, disk dilated into 5 glands between the petals, petals liguliform subglabrous about twice as long as the calyx, stamens 18-22 verticelled in 3-4 rows on the erect hemispherical column, filaments short thick hairy continued up between the anther-cells at the back and not distinguishable from the connective which is produced into a small obtuse point beyond the introrse cells ; *female,* flowers sessile in the divisions of the panicle, calyx and corol as in the male only the latter is generally pubescent, ovary densely stellato-pubescent 2-celled, styles short, stigmas incurved acute, drupe 2-celled (sometimes only 1-celled by abortion), fleshy roundish a little compressed, pretty smooth, somewhat pointed, slightly 4-ribbed olive colored when ripe, cells lined with a firm smooth brown integument ; nuts two thick and very hard. *Willd. Sp. Pl. vol.* iv. *p.* 590. Jatropha Moluccana, *Linn. Sp. Pl. ed.* 1 *p.* 1006. Aleurites triloba, *Forst Roxb. Fl. Ind.* iii. 629. Juglans Cammirium, *Lour.*

This handsome tree is met with wild in parts of Wynad, though probably escaped from cultivation, as it is supposed to have been introduced into this Presidency from the Malay Archipelago ; it is much cultivated in various parts of India, and generally known in this Presidency as the Belgaum Walnut. It is indigenous in many parts of the Eastern Archipelago, and is in cultivation in various parts of the world ; it is very ornamental, but its timber is not, I believe, of any value ; the kernels are eaten and somewhat resemble walnuts, and they yield by expression about 50 *per cent. of a fine clear oil which can be used for the table as well as burning. In the Sandwich Islands a large trade is carried on in this oil, and the kernels strung on sticks are employed as candles, they burn well and slowly and give a clear light. The tree is well worth cultivating for ornamental purposes or shade, and it grows readily from seed, any amount of which can be procured at Manantoddy in the Wynad.*

Analysis.

1. *Male* flower bud.
2. Male flower.
3. Male flower spread out, showing the glands of the disk alternate with the petals and the stamens 22 in 4 verticels on the raised receptacle.
4. A petal glabrous.
5. Inside view of the introrse anther with its hairy filament.
6. Outside view of the same the filament running right up the back between the cells and not distinguishable from the connective, which is produced into an obtuse point beyond the cells.
7. Female flower bud.
8. Female flower.
9. Calyx and ovary.
10. Ovary and its 2 deeply bifid-styles.
11. A petal furnished with stellate pubescence.
12. Ovary cut vertically, ovules pendulous.
13. Ovary cut transversely 2 cells, ovules solitary.
14. Very young fruit. (All drawn from living specimens. I have no fruit, so I have taken the description of it from Roxburgh.)

Dumphy, Lith.

Aleurites Moluccana, (Willd.)

GLOCHIDION NEILGHERRENSE. (Nat. order Euphorbiaceæ.)

GLOCHIDION. *Forst.*—GEN. CHAR. Flowers monœcious, in axillary clusters. Perianth-segments 6, or rarely 5-4 free or shortly united, imbricate in the bud. Glands none. *Male,* stamens 3 to 5 or rarely more. Anthers oblong, sessile on a central column, tipped by their projecting connectivum. *Female,* ovary 3 to 10-celled, with 2 ovules in each cell. Styles short, erect and connivent in an oblong or globular mass or in a short ring, or rarely spreading. Capsule globular or depressed, loculicidally dehiscent or separating into 2 valved cocci. Trees or shrubs. Leaves entire, usually distichous on short petioles, but larger and coarser than in most Phyllanthi. *DeCandolle makes this genus only a section of Phyllanthus.*

GLOCHIDION NEILGHERRENSE. (Wight.) A good sized tree glabrous, much branched, young branches flexuose more or less obtusely angled, leaves rather coriaceous elliptic lanceolate more or less oblique and attenuated at the base gradually and bluntly acuminate at the apex, the margins a little waved, dark green above pale beneath, 3-5½ inches long by 1¼-1¾ broad, petioles reddish 3-4 lines long convex on the upper side. Stipules subulate from a broad fleshy base which is adnate to the stem below the petiole and there connate with its fellow, flowers solitary or several (3-4) together in the axils, bracts several very minute in the axils round the pedicels. *Male,* pedicels slender 1-2 lines long slightly hairy, calyx 6-parted imbricate in 2 series the 3 inner being much narrower, 2-3 lines long, segments yellow linear to oblong slightly hairy on the outside, connectives about ⅓ longer than the anther-cell. *Female,* pedicels ½ a line long or obsolete, calyx rather fleshy 1½ lines long somewhat tubular with 4-6 unequal short triangular teeth some of which are often connate, style-column more than twice as long as the calyx, thick truncate of equal thickness in its whole length or scarcely constricted just at the base, and with 4-5 short mammilate points at the apex, minutely puberulous often only near its base within the calyx or quite glabrous, ovary 4-5 celled, fruit depresso-globose umbilicately depressed in the centre about ½ an inch long subglabrous. *Wight Icones* v. 1907, *letter press only.*

A very common tree on the Nilgiris at the higher elevations about Ootacamund, in flower in May; the male flowers are yellow, the female greenish. I am not acquainted with the timber.

Analysis.

1. Portion of a branch and leaf showing the stipule with its subulate free point and its adnate fleshy base.
2. A male flower bud showing the imbricate sepals very slightly hairy on the outside.
3. A male flower.
4. A male flower fully open.
6. Column of stamens removed.
7. A female flower showing the calyx and column of styles.
8. Calyx opened (in this case 6-cleft lobes unequal, but it varies much and is sometimes only 4-cleft.)
9. Column of styles cut vertically, showing the ovary at the base, ovules pendulous, collateral.
10. A 4-celled young fruit cut transversely, cells 2 ovuled.
11. A 5-celled young fruit.
12. A portion of a branch in fruit. (Drawn from living specimens collected at Ootacamund.)

Govr. Jo. del   Dunphy Lith.

Glochidion Neilgherrense (Wight).

CYCLOSTEMON MACROPHYLLUS. (Nat. order Euphorbiaceæ.)

CYCLOSTEMON. *Blume.*—GEN. CHAR. Diæcious. Calyx deeply 4-5 parted, segments imbricate, petals 0. *Male,* disk concave large naked in the centre or with a minute rudimeut of au ovary. Stamens 4-40 inserted round the margin of the disk, filaments free erect, anthers oblong ovoid or ellipsoid introrse or dehisciug down the outer edge, fixed to the filament at the middle of the back, the connective not produced. *Female,* ovary seated on a small disk 2-4 celled, 2-4 sulcate, cells 2 ovuled, ovules collateral peudulous, styles as many as ovary-cells connate at the base, nearly obsolete or filiform, stigmas broad triangular and deeply 2-lobed or narrow and linear. Fruit indehiscent more or less fleshy with 2-4-crustaceous cocci. Seed compressed, with a caruncle, albumeu copious fleshy, cotyledons plane foliaceous, radicle very small superior. Trees, leaves alternate simple penniveined entire or toothed coriaceous, stipules deciduous. Flowers fascicled from tubercles in the axils of the leaves or from old axils. *Blume Bijd. p.* 597. Sphragidia, *Thw. in Hook. Journ. Bot.* 1855, *p.* 269. *t.* 10. Pycnosandra, *Blume. Mus. Bot. Lugd. Bot.* 2. 191. Dodecastemon, *Hassk. in Bot. Zeit. p.* 803.

DeCandolle divides this genus into 3 Sections as follows :—

1. *Dodecastemon.*—Ovary 3-4 celled, styles 3-4 filiform.
2. *Stenogynium.*—Stamens few, ovary 2-celled, stigma sublinear entire peltately dilated at the apex.
3. *Eucyclostemon.*—Stamens many, ovary 2-celled, stigmas broad 2-lobed.

Tho following species belongs to the 3rd Section,

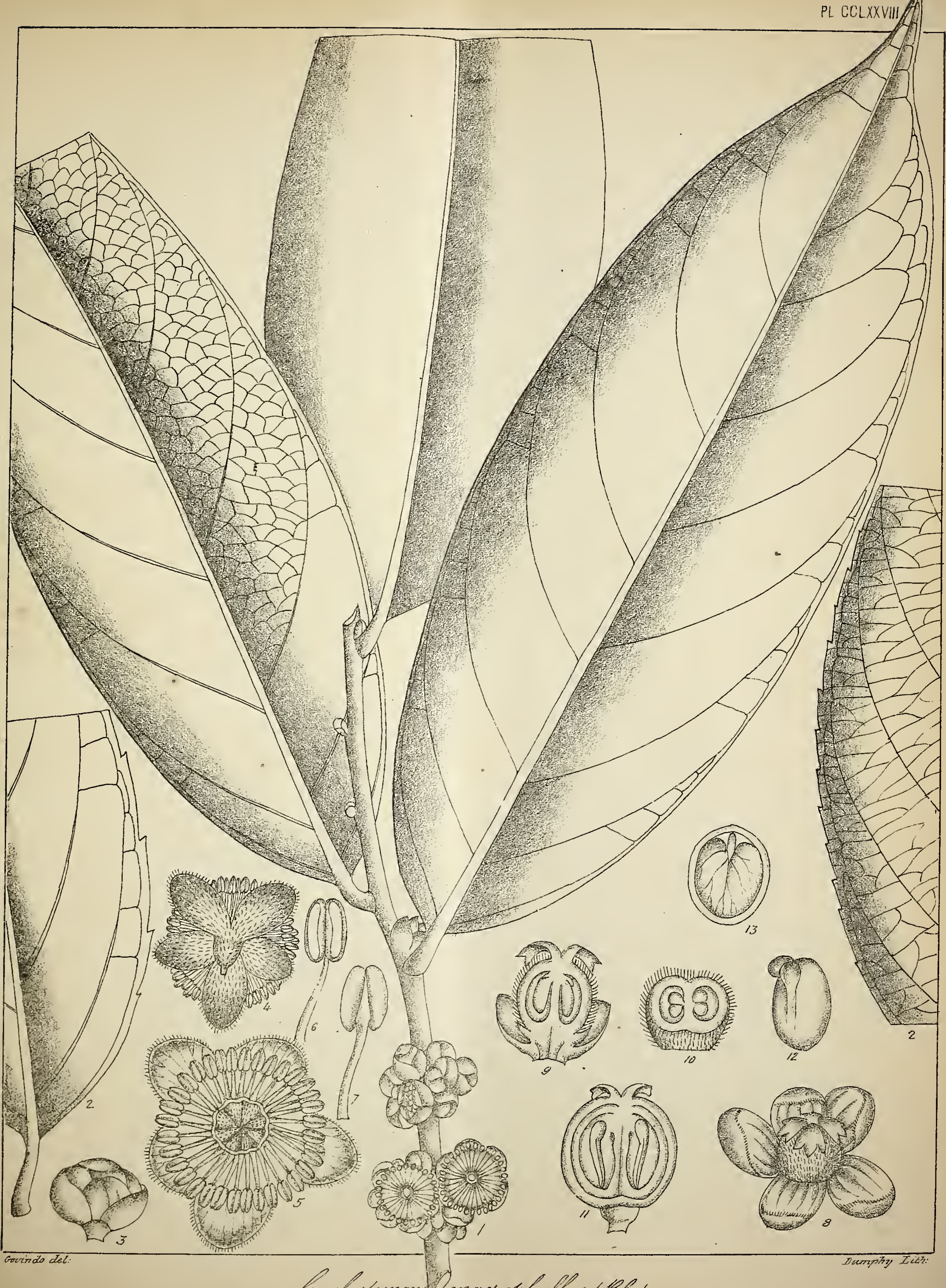
CYCLOSTEMON MACROPHYLLUS. (Bl.) A large tree of no great height but with a very thick trunk and branches spreading in every direction, ramuli terete and with the gemmæ tomentose, leaves very coriaceous entire or with a few distant serratures sometimes prominent but often inconspicuous, oblong to lanceolate, acuminate at the apex, 4-12 inches long by 2-4½ inches broad, glabrous in age but when young more or less furnished with a deciduous brown tomentum, petioles 3-4 lines long, veins and veinlets very prominent beneath, stipules small erect lanceolate deciduous, flowers fascicled in the axils or at the old axils (shortly pedicelled or) sessile on the tubercles, densely velvetty outside, males 3-8 together or rarely solitary, females solitary or 2-3 together. *Male,* calyx 4-5 parted 8-9 lines in expansion, segments equal concave rounded, stamens 35-40, rudiment of ovary minute or wanting. *Female,* ovary strigose seated on a disk which is hid in the pubescence, stigmas 2 subsessile each deeply 2-lobed, the segments triangular with a broad 3-cleft apex and narrow base, fruit globose about 1 inch in diameter. *Bl. Bijd. p.* 598. Sphragidia Zeylanica, *Thw. l. c.*

Var. β. sessiliflora.—Flowers sessile.

This tree is very common in the dense moist forests of the Anamallays 2000-4000 *feet elevation, and in Coorg (the water-falls near Mercara),* 4000 *feet, and I have it from other parts of our Western ghats, Travancore, &c., and it is found in Ceylon and Java. All my Indian specimens have the flowers sessile and the leaves occasionally serrated, though often quite entire, and the petioles do not exceed* 4 *lines in length ; in these points only does it differ from the Ceylon tree, so that it cannot, I think, be more than a variety ; the timber is very hard but quite unknown.*

Analysis.

1. Branch of male tree in flower, leaves entire.
2. Serrated leaves.
3. A male flower bud.
4. A male flower, underneath view.
5. A male flower 35 stamens, no rudiment of ovary present (there is sometimes a small one in the centre of the disk.)
6. Anther, front view.
7. Anther, back view.
8. Female flower.
9. The same cut vertically, showing the pendulous ovules.
10. Ovary cut trausversely, 2 cells each 2-ovuled.
11. Fruit cut vertically.
12. Seed.
13. Seed cut vertically. (Drawn from living specimens.)



Govindo del: Dunphy Lith:

Cyclostemon macrophyllus. (Bl.)

HEMICYCLIA ELATA. (Nat. order Euphorbiaceæ.)

HEMICYCLIA. *W.A.*—GEN. CHAR. Diæcious. Calyx deeply 4-5-parted, segments imbricate, petals 0. *Male*, stamens 8-25 inserted at or near the margin of a central entire or crenated disk, anthers 2 celled, dehiscing longitudinally, filaments free, rudiment of ovary wanting or very small. *Female*, staminodia 0, disk annular entire or slightly crenate, ovary oblong or globose 1-celled, ovules 2 collateral pendulous from near the apex of the cell, style none or scarcely any, stigma large peltate, fruit (by abortion) a 1-seeded indehiscent drupe, putamen bony or cartilaginous, testa membranaceous, cotyledons large membranaceous, lying in copious albumen, radicle superior very short. Trees or shrubs, leaves alternate shortly petioled simple penniveined entire or toothed, stipules small soon deciduous, flowers small axillary fasciculate, the female often solitary. *W.A. in Edin. New. Philos. Journ. v.* xiv. *p.* 297. Astylis, *Wight Icones.* Auaua, *Miquel.* Periphlexis, *Wall. Cat.* 8022.

This genus scarcely differs from Cyclostemon except in its single-celled ovary.

HEMICYCLIA ELATA. (Bedd.) A lofty straight glabrous tree up to 90-100 feet high, gemmæ minutely puberulous, leaves lanceolate attenuated at both ends more or less oblique at the base ending in a blunt or sharp acumen at the apex, quite entire subcoriaceous, in age glabrous on both sides and shining above, 4-5 inches long by 1½-2 broad, petioles 3-4 lines long. *Male*, flowers 3-5 together in axillary fascicles, peduncles 1-2 lines long tuberculate and furnished with several pubescent bracts, pedicels slender 5-8 lines long, calyx about 2 lines long puberulous on both sides deeply 4-parted, stamens 8-12 the filaments inserted into little ring-like pits round the outer portion of the disk, rudiment of ovary generally absent, sometimes present but very small. *Female*, flowers solitary, peduncle obsolete or only a minute tubercle with a small bract, pedicel slender 9-10 lines long elongating in fruit to nearly 2 inches, calyx as in the male but a little larger, segments soon deciduous, disk annular, ovary oblong, stigma sessile large peltate covering the apex of the ovary like a mushroom, fruit oblong or somewhat obovate 10 lines to 1 inch long, putamen cartilaginous.

*This fine tree is very common in the dense moist forests of the Wynaad (*2000-4000 *feet elevation), and I also have it from the Anamallays and Tinnevelly mountains; the leaves are less coriaceous than in H. venusta, but have exactly the venation and shape of that species, which is a small drooping tree with a different inflorescence. H. sepiaria has much more coriaceous differently shaped leaves, and is scarcely more than a shrub ; the timber is strong and much valued for building purposes.*

Analysis.

1. Branch of the male tree in flower.
2. Branch of the female tree in flower.
3. A male flower bud.
4. A male flower showing 8 stamens (each let into little ring-like pits round the outer part of the disk), no rudiment of ovary.
5. Male flower with 9 stamens and a small rudiment of an ovary.
6. Anther, back view.
7. Anther, front view.
8. Female flower, 4 imbricate deeply parted segments (as in the male), disk annular, ovary oblong, style none, stigma sessile and mushroom like.
9. Ovary cut vertically, 1-celled, 2 collateral ovules pendulous from a little below the apex.
10. Ovary cut vertically, placenta large.
11. Branch in young fruit.
12. Ripe fruit cut open, the sarcocarp fleshy, the putamen cartilaginous.
13. The solitary seed cut vertically, albumen copious, the short superior radicle slightly exserted at the apex, the cotyledons very thin and leafy. (Drawn from specimens in spirits.)

Hemicyclia elata, Bedd.

BACCAUREA SAPIDA. (Nat. order Euphorbiaceæ.)

BACCAUREA. *Lour.*—GEN. CHAR. Diæcious or rarely monæcious. Calyx 4-6 rarely 7-8-parted, segments sometimes unequal imbricate in æstivation, petals 0, disk present or wanting or rudimentary. *Male,* stamens 4-10, filaments free inserted round the lobed or disk-like rudiment of an ovary, anthers 2-celled introrse or rarely extrorse. *Female,* ovary 2-5 celled, cells 2-ovuled, stigmas subsessile broad 2-3-lobed or lacerate more or less papillose, fruit indehiscent semicarnose 1-5-celled, cells 1-2-seeded, seed arillate albuminous, cotyledons ovate 3-nerved, radicle short. Trees, leaves alternate opposite or subopposite petioled, bistipulate simple penniveined elliptic entire or subdentate, inflorescence racemed or in spike like panicles generally densely clustered together on the trunk or older boughs, rarely axillary. *Lour Flor. Cochinch. ed. Willd. v.* 2 *p.* 813. Pierardia, *Roxb. Fl. Ind.* ii. 254. Microsepala, *Miq. Fl. Ind. Bat. Suppl. p.* 444. Hedycarpus, *Miq. Fl. Ind. Bat. vol.* 1 *part* 2 *p.* 359. Adenocrepis, *Bl. Bijd. p.* 579. Caliptroon, *Miq. Fl. Ind. Bat. Supp.* i. 471.

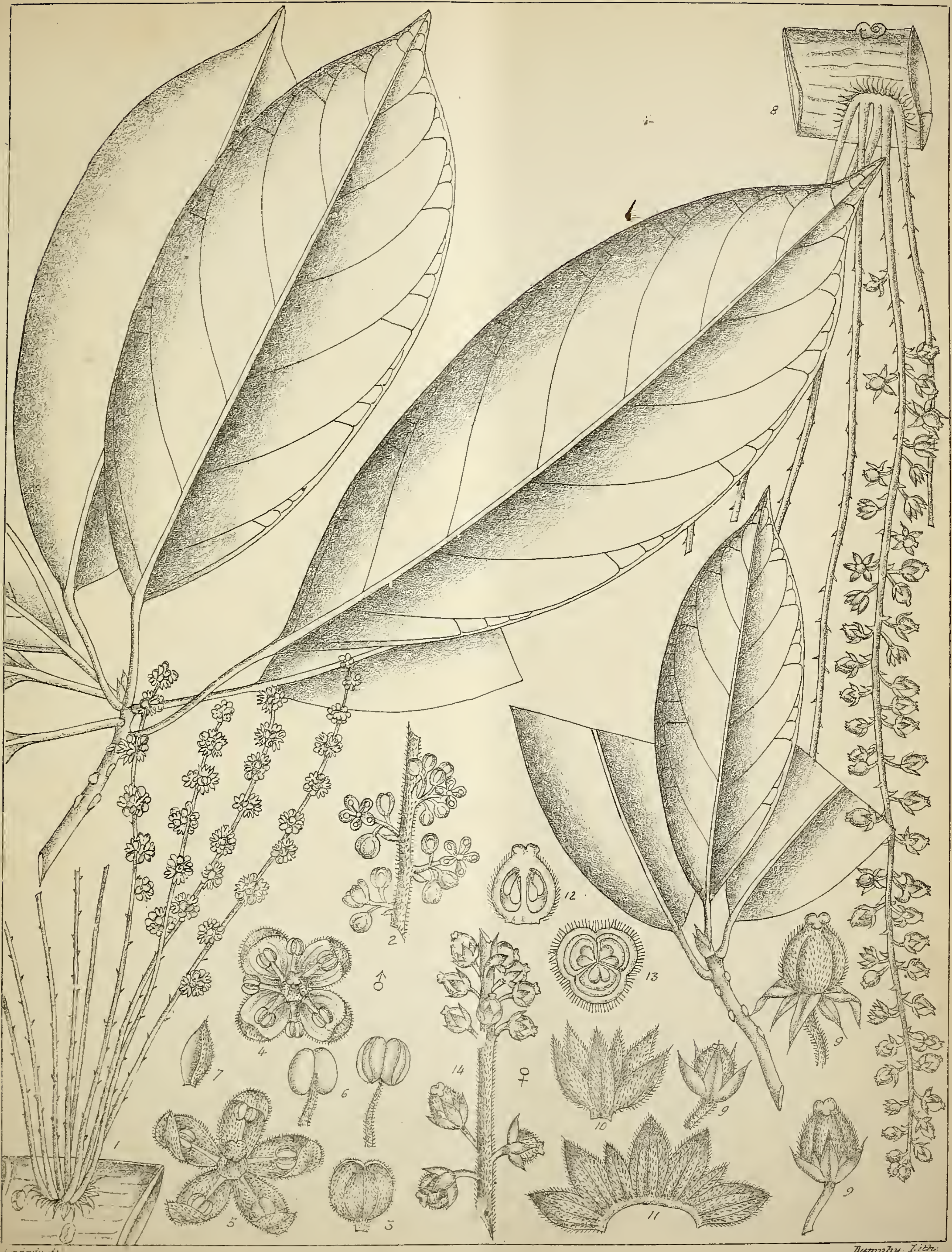
Section PIERARDIA.—Disk suppressed or only rudimentary, stamens 4-10, anthers introrse, ovary 3-2-celled.

BACCAUREA SAPIDA. (Roxb.) A middling sized tree, young parts minutely pubescent, leaves glabrous elliptic with a short blunt acumination entire or sometimes slightly scolloped, 3-8 inches long by $1\frac{1}{4}$ to $2\frac{3}{4}$ broad, petioles 6-18 lines long, stipules ovate deciduous. *Male,* flowers very small reddish scarcely 1 line long, spikes puberulous 7-10 inches long generally much crowded on the trunk sometimes almost as dense as a bottle brush, rarely on the branches, paniculate or racemose, the pedicels scarcely $\frac{1}{2}$ a line long crowded in little heads of 3-7 together with or without a short peduncle and with an ovate concave bract at the base, calyx puberulous 4-5 rarely 6-parted, segments equal incurved at the apex, stamens 5-10 (generally 7-8 in the 4-sepaled flowers and 5 in the 5-sepaled ones), rudiment of ovary entire discoid or 2-5 lobed. *Female,* flowers about double as large as the male, in simple puberulous racemes which are 8-12 inches long, pedicels $1\text{-}1\frac{1}{2}$ lines long irregularly arranged along the rachis alternate or opposite and distant or rather crowded each with a minute ovate bract at the base, calyx puberulous generally 5-parted sometimes 6-7-8-parted, segments generally very unequal, disk wanting, ovary very hairy ovate truncate at the apex 3-celled, ovules pendulous, stigma sessile 3-lobed, fruit subglobose 1 inch or a little more in diameter, the rind rough but without any hairs marked with 3 prominent ridges running from the apex to the base, bright crimson when ripe, seeds 1-2 only from abortion each enclosed in a succulent acid edible aril.—Pierardia sapida, *Roxb. Fl. Ind.* ii. 254. P. macrostachys et Courtallensis, *Wight's Icones* 1912-13. Baccaurea sapida et Courtallensis, *DC. Prod.* xv. *p.* 459.

This tree is most abundant in all our moist ghat forests from Canara down to S. Travancore up to 3500 *feet elevation, and I have copious specimens from all parts; the leaves are alternate and opposite on the same tree and a single spike of flowers will often show all the variations in the perianth and number of stamens, and there can be no doubt that Wight's* 2 *species belong to the same tree, and are not even varieties. I have not seen Roxburgh's tree, but his description answers very fairly for this species except that the fruit is described as yellow; the fruit (or rather the aril of the seed) is a very pleasant acid, it generally hangs in great profusion from the trunks, the whole trunk appearing as a crimson mass. The tree is also found on the mountains in East Bengal and Birmah, but does not I believe occur in Ceylon; the timber is hard and heavy, but I have never known it in use, but then (as is the case with most of our moist forest trees) it only grows in localities overstocked with many well known timbers, so that it never receives the chance of a trial. In Birmah it is used, I believe, for wheel-axles. In South Canara the tree is called Koli kukee (Canarese.)*

Analysis.

1. Male inflorescence.
2. Portion of the panicle magnified, the pedicels sometimes sessile in a crowded head (racemose), sometimes with a common peduncle (paniculate).
3. A male flower bud.
4. A male flower open, 4 imbricate sepals, 7 stamens, disk none or almost obsolete, rudiment of ovary 4-lobed.
5. A male flower showing 5 sepals and 5 stamens, rudiment of ovary sub 5-lobed.
6. Anthers, front and back view.
7. The bract present at the base of each of the heads of male flowers.
8. Female inflorescence.
9. Female flowers, sepals imbricate often very unequal.
10. A 6-parted calyx.
11. A 7-parted calyx.
12. Ovary cut vertically, ovules pendulous.
13. Ovary cut transversely, 3 cells each 2-ovuled.
14. Portion of a female raceme magnified. (All drawn from fresh specimens.)



Govindo del. Dumphy Lith.

Baccaurea sapida. (Roxb.)

TREWIA NUDIFLORA. (Nat. order Euphorbiaceæ.)

TREWIA. *Linn.*—GEN. CHAR. Diæcious. Petals aud disk absent both in the male and female. *Male,* calyx 3-4 parted, segments equal valvate. Stameus numerous (about 80) central inserted ou a depressed hemispherical receptacle, filaments free, anthers basifixed oblong 2-celled dehiscing longitudinally extrorse and introrse, connective not produced; no rudiment of an ovary. *Female,* calyx sheathing unequally 3-4 toothed at the apex soon deciduous, ovary 3-4 celled, cells 1-ovuled, ovules pendulous, styles 3-4 (equalling the number of the ovary cells) slightly combined at the base, stigmas elongate simple very papillose, fruit a fleshy depresso-globose drupe with 3-4 hard cocci; seed exarillate, albumen copious, cotyledons foliaceous, radicle superior. A tree, leaves opposite broad ovate or cordate membranaceous entire glandless or furnished with 2 rarely 4 glands about the base, long petioled, 3-5 nerved, racemes axillary, flowers small crowded in the male, few in the female.—Tetragastris, *Gærtn. fruct.* 2 *p.* 130. *t.* 109. *f.* 5.

TREWIA NUDIFLORA. (Linn.) A middling sized tree, young branches angled, young parts pubescent, stipules linear subulate soon caducous, leaves subglabrous in age, cordate rounded or suddenly cuneate at the base with a more or less tapering acumen at the apex, finely venose, 4-7 inches long by 3-5½ broad, petioles 1½-3 inches long. *Male,* racemes pendulous many flowered as long as or exceeding the leaf slightly stellato-puberulous, flowers about 3 lines long generally 3 together with a small ovate bract at the base, pedicels about 1 line long, flower-buds globose. *Female,* racemes few-flowered, the flowers including the styles 12-15 lines long; drupe hoary 12-15 lines in diameter, all the rest as in the generic character. *Roxb. Fl. Ind.* iii. 837;—*Wight's Icones* 1870-71. Tetragastris ossea, *Gærtn.* Trewia macrophylla, *Roth.* Rottlera Indica, *Willd.* Rottlera Hoperiana, *Blume.* Trewia macrostachya, *Klotzsch.*

A common tree throughout the plains of this Presidency, also in Bengal, Ceylon, Java and Sumatra; the timber is soft and of no value; in South Canara the tree is called Kat Koombla (Canarese), and in Bombay Pitari.

Analysis.

1. Brauch of a male tree in flower (life size.)
2. Portion of a male raceme highly magnified.
3. A male flower bud just opening, calyx valvate.
4. A 3-sepaled male flower, no disk, no rudiment of ovary.
5. A 4-sepaled male flower.
6. Anthers (front and back view) basifixed.
7. A branch of female tree in flower (life size.)
8. Female flower, 3 styles and stigmas, this belongs to a 3-celled ovary; when the ovary is 4-celled there are 4 styles, (the calyx fallen off leaving only an undulated ring ?)
9. Female flower showing the calyx.
10. Portions of the stigma highly magnified.
11. Ovary cut vertically, ovules pendulous.
12. A 3-celled ovary cut transversely.
13. A 4-celled ovary cut transversely, (the calyx has fallen away from all my specimens of the female flower. No. 9 is copied from Wight's drawing, the rest from dried specimens.)

Trewia nudiflora. Linn.

PODADENIA THWAITESII. (Nat. order Euphorbiaceæ.)

PODADENIA. *Thw.*—GEN.CHAR.*Male.* Calyx 3-4-parted valvate in bud, petals 0, disk 0, stamens numerous (about 30), filaments free central and seated on a hemispherical receptacle and mixed with numerous glands, anthers globoso-oblong dehiscing longitudinally down the outer edge, attached to the filaments at the centre of the back, connective bluntly apiculate beyond the cells, rudiment of ovary 0. *Female,* calyx 5-4-parted imbricate in the bud, petals 0, disk 0, staminodia linear subulate 1·5 sometimes present, alternating with the calycine-segments or altogether absent, ovary 3-celled, cells 1 ovuled, ovules pendulous. Styles 3 simple long very papillose except at the recurved apiculate apex, fruit fleshy indehiscent 3-or by abortion 1-2 seeded, seed covered with an entire thick fleshy aril, ecarunculate. A large tree, leaves alternate petioled entire penniveined without glands, flowers small in terminal panicles which are densely furnished with glandular hairs. *Thw. En. Pl. Zey. p.* 273;—*DC. Prod.* xv. *p.* 791.

PODADENIA THWAITESII. (Baillon.) A very large tree, young parts fulvo-or rufo-tomentose, leaves obovate very shortly and abruptly acuminate, without glands, in age glabrous above except the costa and primary veins, pilose beneath, 5-10 inches long by $2\frac{1}{2}$-5 inches broad, petioles cylindric tomentose $\frac{3}{4}$-2 inches long, panicles tomentose and with the calyx, &c. densely furnished with stipitate glands or rather gland-tipped hairs; flowers reddish, the male densely fascicled in heads along the branchlets each head being furnished with an ovate acute bract, pedicels 2-3 lines long, flower bud acuminate; female flowers solitary or subsolitary with bracts as in the male, ovary and styles glandular, stigmas spirally twisted and apiculate and glabrous at the apex, fruit subspherical $1\frac{1}{2}$ inches in diameter reddish, densely echinate with large stipitate glands, seed oblong 8-9 lines long 4-5 lines broad, testa bony brown, aril white.—Rottlera (Stylanthus) Thwaitesii, *Baillon Etude. des Euphorb. p.* 426. Podadenia sapida, *Thw. En. Pl. Zey. p.* 273.

Ceylon, Ambagamwa and near Ratnapoora 1000-2000 *feet elevation; this fine tree is, as far as we know, confined to Ceylon; the fleshy aril has an agreeable flavor. Nothing is known of the timber or uses of the tree.*

Analysis.

1. Branch with male inflorescence (life size.)
2. Magnified portion of a branch of the panicle.
3. Flower bud, calyx valvate.
4. The same opening.
5. Full flower, stamens 30.
6. Stamens and the intermixed glands.
7. Anther, front view.
8. Anther, back view.
9. Branch with female inflorescence.
10. A female flower showing the presence of 1 staminode.
11. The imbricate 5-parted calyx.
12. A staminode much magnified.
13. The glandular ovary and styles.
14. Highly magnified view of a stigma.
15. Ovary cut vertically, pendulous ovules.
16. Ovary cut transversely 3-celled, cells 1 ovuled. (Drawn from dried specimens.)

Govindo del:

Dumphy Lith

Podadenia Thwaitesii. (Baill:)

CROTON SCABIOSUM. (Nat. order Euphorbiaceæ.)

CROTON. *Linn.*—GEN. CHAR. Monœcious or rarely diœcious. *Male*, calyx 5 (rarely 4-6) parted valvate or imbricate, petals as many as the calyx-lobes and alternate with them, or sometimes obsolete or more or less rudimentary imbricate in æstivation, disk dilated into 5 glands alternate with the petals, stamens central usually 10-20 (rarely fewer or very numerous), filaments free basifixed, anthers adnate 2-celled, rudiment of ovary 0. *Female*, calyx as in the male, petals more or less rudimentary or none, disk as in the male or often less developed; ovary 3-(rarely 2-4)-celled, cells 1-ovuled, ovules pendulous, styles 3 (rarely 2-4) 2-cleft or branched. Fruit a capsule dividing into 2 valved cocci, albumen present, cotyledons ovate equalling the radicle. Trees, shrubs or herbs, leaves alternate entire or divided petioled penniveined or 3-5-nerved, racemes or spikes terminal usually with the male flowers numerous above and a few female flowers below.—Tridesmis, *Lour.* Astrogyne, *Benth.* Dacarinium, Drepadenium and Heptalla, *Rafin.* Hendecandra, *Eschw.* Pentalostigma, *Mart.* Argyrodendrou, Astræa, Barhamia, Brachystachys, Cleodora, Codonocalyx, Crotonanthus, Cyclostigma, Engelmania, Eutropia, Geiseleria, Lasiogyne, Leucadenia, Medea, Ocalia, Pilinophytou, Podocalyx, Podostachys, Tiglium, Timandra, *Klotzch.* Geiseleria, *Miq.* Angelandra, *Endl.* Gynamblosis, *Torr.* Calyptriopetalum, *Hassk.* Klotzschiophyton, *Baill.* Aubertia and Monguia, *Chapel.* Argyra, *Noronha.* Anisophyllum and Furcaria, *Boiv.* Myriogomphus, *Fr. Diedrichs.*

CROTON SCABIOSUM. (Bedd.) A small tree, young branches, both sides of the leaves, inflorescence, fruit, and in fact every part of the plant densely covered with close-set silvery smooth scab-like scales, leaves rather coriaceous ovate to cordate acute slightly and irregularly toothed, 2-4½ inches long by 1¼-3 broad, golden when young silvery in age particularly beneath, 3-5 nerved at or a little above the base without glands round the margins, petioles 8-24 lines long often with 2 conspicuous round glands at the apex on the upper side, stipules lanceolate acute 3-4 lines long sometimes toothed at the margins, racemes short generally from the apex of small lateral branches. *Male*, flowers numerous about 2½ lines long solitary or 2-3 together from a small ovate acute concave bract, pedicels about a line long. *Female*, flowers generally 1-2 at the base of the raceme a little longer than the males, petals of the male ligulate densely white-woolly round the margins and at the base, disk of 5 two-lobed prominent glands opposite the calyx-segments, stamens 10, filaments glabrous, anthers basifixed, connective very broad and running up the whole anther, the cells adnate to the sides, petals in the female small linear ciliate sometimes obsolete or only 1-2 present, ovary 3-celled, styles deeply 2-cleft the divisions entire smooth filiform recurved and ending in a fine point, fruit 5-6 lines long 3-lobed, seed smooth with a conspicuous scar.

I have only found this very distinct species on the Nullay Mallay mountains, Kurnool district, where it is most abundant about the Yerrachalma (2000-3000 *feet elevation*) *; its very silvery appearance renders it highly ornamental.*

Analysis.

1. Portion of a leaf magnified, showing the dense scab-like glabrous silvery scales.
2. Inflorescence at the apex of 2 lateral ramuli, life size (flowers all male in this instance ; there are generally 1-2 females present at the base of the raceme.)
3. A branch (life size) showing a raceme with 1 fruit at the base, and male flower buds at apex.
4. A male flower bud.
5. A male flower, stamens 10.
6. The male flower opened, showing the insertion of the petals and stamens, and the 5 two-lobed glands of the disk, no rudiment of ovary.
7. A petal.
8. Anthers front and back view, the thick connective runs up the entire centre so that the front and back view is exactly the same.
9. A female flower, only 1 rudimentary petal present, 2 styles (there are generally 3), stigmas filiform entire.
10. A female calyx opened, the segments rather unequal.
11. A petal from female flower.
12. Ovary cut vertically, ovules pendulous.
13. Ovary cut transversely, 3-celled each 1-ovuled.
14. A seed, the scar or hilum prominent. (Drawn from dried specimens.)

Fig. *A.* represents a female flower, an anther, and portion of a leaf from the male of Croton aromaticum. (vide Manual.)

Gmndo del: Dumphy. Lith:

Croton scabiosum: (Bedd:)

CHŒTOCARPUS CASTANOCARPUS. (Nat. order Euphorbiaceæ.)

CHŒTOCARPUS. *Thw.*—GEN. CHAR. Diœcious. Calyx in both sexes 4-parted imbricate in æstivation, petals 0, disk irregularly lobed. *Male*, stamens 8-16 joined below into a central pilose column round the rudimentary ovary, filaments free above, the exterior alternate with the sepals and lobes of the disk, anthers introrse sub-basifixed, 2-celled dehiscing longitudinally, rudiment of ovary entire or 2-3 fid. *Female*, ovary surrounded by the lobed disk 3-celled, cells 1-ovuled, ovules pendulous, styles 3 bifid to nearly the base fimbriate, fruit a capsule echinate or warty dehiscing loculicidally with hard valves, seed ovate shining pendulous furnished with a large 2-lobed fleshy caruncle, cotyledons plano foliaceous in copious albumen, radicle very short superior. Trees, leaves alternate bistipulate petioled penniveined coriaceous entire without glands, flowers small fascicled in the axils, shortly pedicelled or subsessile furnished with scale-like bracts. *Thw. in Hook. Lond. Journ. of Bot.* vi. *p.* 300.

CHŒTOCARPUS CASTANOCARPUS. (Roxb.) A tree variable in size, sometimes large, sometimes middling sized, or small and much branched; young parts minutely pubescent, leaves oblong or ovate-oblong to broad lanceolate with a long acumination, entire glabrous 3 to 9 inches long by 1¼ to 3 inches broad; petioles 3-4 lines long, stipules falcate, flowers axillary slightly pubescent, the male more crowded about 2 lines long, stamens 8, the female slightly larger, bracts pubescent scale-like, fruit subspherical as large as a nutmeg echinate with rigid inoffensive fragile yellowish-brown bristles, caruncle crimson.—Adelia castanicarpa, *Roxb. Fl. Ind.* iii. *p.* 848. Chœtocarpus, *Thw. En. Pl. Zey. p.* 275.

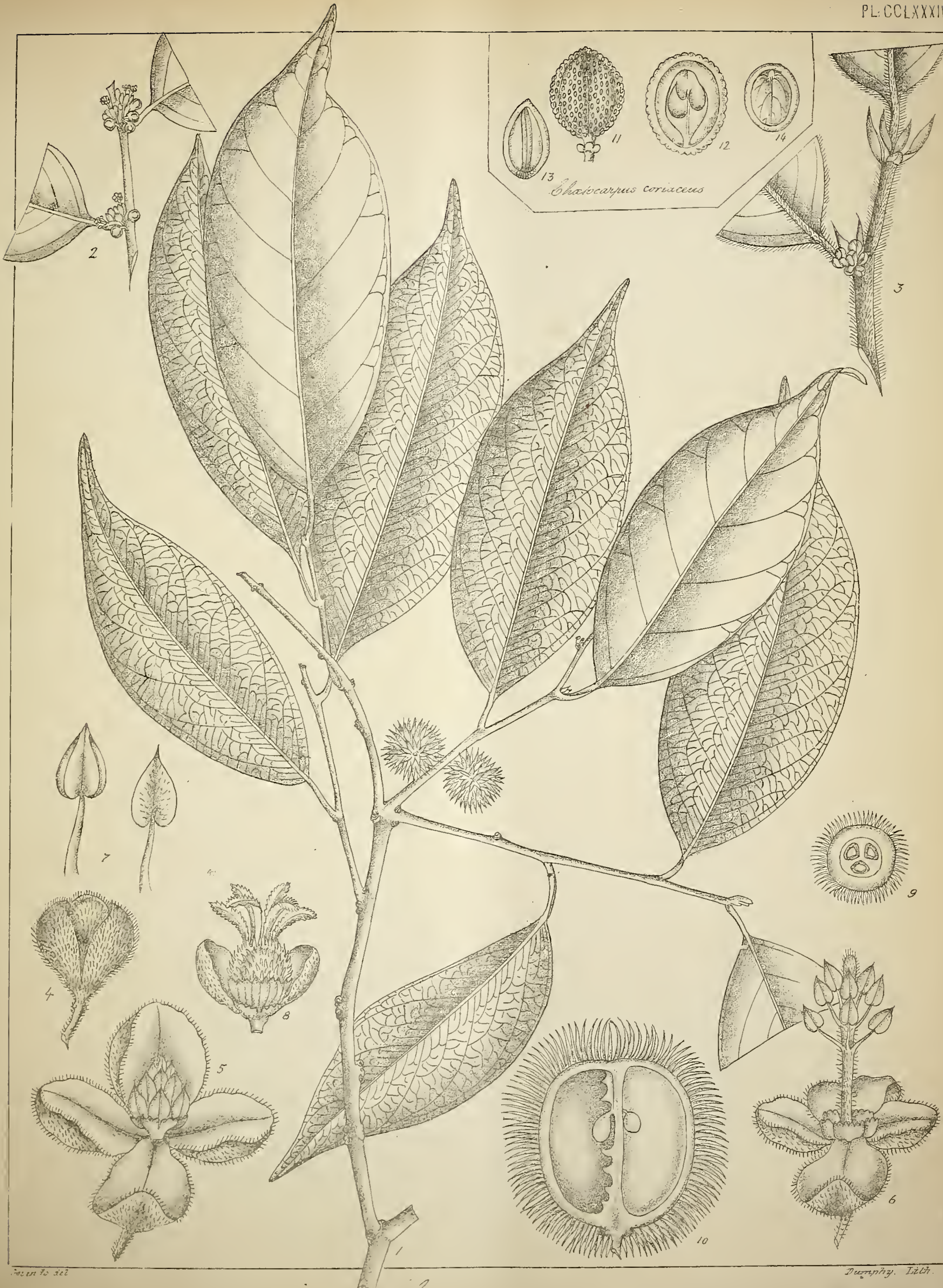
Var. β. pubescens.—Young branches and under surface of the leaves more or less pubescent.

Ceylon, common in the Ratnapura and Ambagamwa districts; Var. β in the Pasdoon Corle; also found in Silhet, Khasia, Birmah, &c., so that it very probably occurs in our Western ghat forests, but I have not met with it. The timber is very hard and in use for building purposes.

Analysis.

1. Branch of a female tree in young fruit (the glabrous variety.)
2. Portion of a branch from a male tree in flower.
3. Portion of a branch of a male tree (Var. β pubescens.)
4. A male flower bud, 2 opposite pair of imbricate segments.
5. A young male flower on first opening.
6. A full male flower showing the lobed crenulate disk and the 8 stamens joined in a central column round the abortive ovary.
7. Anthers, front and back view.
8. Female flower, 2 sepals removed to show disk, the echinate ovary and styles.
9. The same cut vertically, 3 cells each 1-ovuled.
10. A fruit cut vertically, seeds pendulous (in this instance small and aborting.)
11. Ripe fruit of Chœtocarpus coriaceus (life size.)
12. Vertical section of the same.

13, 14. Seed cut open vertically, showing the foliaceous thin cotyledons seated in the albumen and the minute superior radicle near the hilum. (Drawn from dried specimens)



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Dunphy. Lith.

Chætocarpus castanocarpus: Roxb.

GIVOTIA ROTTLERIFORMIS. (Nat. order Euphorbiaceæ.)

GIVOTIA. *Griff.*—GEN. CHAR. Diæcious. Calyx 5-parted imbricate, petals 5 alternate with the calyx-segments. *Male,* disk large fleshy 5-lobed the lobes alternate with the petals, stamens central 16-15 (10 inner long, 6 outer short) more or less united into a very short column at the base but some quite free, filaments free above and hairy on their lower half, anthers 2-celled dehiscing longitudinally fixed by the centre of the back, no rudiment of ovary. *Female,* disk annular sub 5-lobed, ovary 2-3-celled, cells 1-ovuled, ovules pendulous, styles 2-3 each 2-cleft, fruit a drupe with a hard 1-seeded nut, seed exarillate, albumen copious, cotyledons broad foliaceous palmatinerved, radicle short superior. A tree, leaves alternate cordate long-petioled palmatinerved and with all the young parts densely stellato-pubescent; flowers in long terminal panicles. *Griff. Pl. Hort. Calc.* 14. *(ex Endl.)* Govania, *Wall. Cat.* 7851.

GIVOTIA ROTTLERIFORMIS. (Griff.) A middling sized tree, leaves cordate or broadly ovate, somewhat lobed and scollop-toothed acute at the apex, without glands, 7-nerved, densely pubescent on both sides when young, in age more glabrous above, but covered with dense white down beneath, 4-6 inches long by 3½-6 broad, petioles 3-5 inches long sometimes with 2 prominent glands about the middle, panicles 10-20 inches long covered with dense white stellate pubescence, flowers congested at the apex of the branchlets, bracts filiform 3 lines long, flowers about 4 lines long as in the generic character, 2 of the segments of the calyx with a blunt appendage on the outside below the apex, fruit oblong the size of a pigeon's egg. *Wight Icones. tab.* 1889.

A very common tree in all dry subalpine forests on the west side of this Presidency, also on our eastern mountains and in Ceylon; *it is called Tella Poonkee in Teligu, Vendàle in Tamil*; *the wood is very light and soft and used to make toys, imitation fruit, boxes, &c., and catamarans*; *it takes paint very well*; *the seed yields an oil valuable for fine machinery.*

Analysis.

1. Brauch of a male tree in flower.
2. A male flower bud, sepals imbricate.
3, 4. Male flowers, 2 of the sepals with an appendage on the outside below the apex, petals imbricate.
5. Calyx cut open.
6. The 5-lobed disk and stamens removed from the flower, filaments 16, some free others connate, the 6 outer ones shorter than the 10 inner.
7. Anthers front and back view, filaments attached to centre of the back of the anther.
8. A few anthers removed from the column to show that they are connate at the base. (All drawu from living specimens.)

Fig 9—12. Views of the female flower and ovary copied from Dr. Wight's drawing (as I have no specimens of the female at hand.)

Gouvio, del. Dunphy lith.

Givotia rottleriformis (Griff.)

APOROSA LINDLEYANA. (Nat. order Euphorbiaceæ.)

APOROSA. *Blume.*—GEN. CHAR. Diæcious, petals and disk 0 in both sexes. *Male,* calyx 3-6 generally 4-parted imbricate, stamens 2-5, rudiment of an ovary minute or absent, filaments free, anther cells distinct globular dehiscing longitudinally. *Female,* calyx 4-6-parted imbricate, ovary 2-3-celled with 2 pendulous ovules in each cell, styles equal in number to cells of ovary very shortly united short recurved retuse or 2-lobed, drupes 2-3-celled or often only 1-celled by abortion, with a single seed in each cell. Trees or shrubs, leaves alternate petioled bistipulate generally lanceolato-ovate, penniveined entire or toothed, the male inflorescence in catkins, the female in axillary clusters or short spikes. *Bl. Bijdr. p.* 514. Leiocarpus, *Bl. l. c.* 581. Lepidostachys, *Lindley.* Scepa, *Lind.* Tetractinostigma, *Hassk.*

APOROSA LINDLEYANA. (Wight.) A small or middling sized tree, gemmæ puberulous, branches glabrous, leaves glabrous lanceolato-ovate acute or obtuse at the base and apex, entire, 4-6 inches long by 1½-2¼ broad, petioles 3-4 lines long. Stipules ovate-oblong obtuse erect very membranaceous soon caducous a little pilose on the outside, 5 lines long by 2-3 lines broad. *Male,* catkins sessile often forked about 1 inch long solitary or 2-3 together at the old axils or axillary, bracts broader than long ciliate fimbriato-denticulate, calyx 4-6 parted, segments obovate or rhomboid ciliate about ½ a line long, anthers 2-5 more or less exserted. *Female,* spikes solitary or twin, about 3 lines long densely bracteate, bracts broad ovate ciliate, flowers on pedicels ½ to 1 line long, calyx generally 5-parted, segments broad ovate very small, ovary ovoid acute fulvo-pilose 2-3-celled, stigmas short bifid papillose, ovules pendulous from an enlarged placenta which reaches more than ½ down the cells and which has a projection ½ covering the ovule, fruit subglobose shortly apiculate ½ an inch long subsessile or on a pedicel 1-2 lines long.—Scepa Lindleyana, *Wight Icones tab.* 361.

This tree is most abundant throughout Coorg and the Wynaad up to 4000 *feet elevation, and is to be met with throughout our western forests, Bombay and Ceylon, and is also found in Sikkim; in South Canara it is called Sulla, and in Mysore Surroli (both Canarese names), and in Ceylon Kabella; the wood is in use for building and other purposes.*

Analysis.

1. A branch of a male tree in flower (life size.)
2. Portion of a male catkin magnified.
3. A 4-sepaled male flower with 2 stamens and a minute abortive ovary.
4. A 4-sepaled male flower with 3 stamens and an abortive ovary.
5. A 4-sepaled male flower with 5 stamens and no rudiment of an ovary.
6. A 6-sepaled flower with 4 stamens, no rudiment of ovary.
7. A segment of the calyx showing the margin ciliate.
8. Anthers, front and back view.
9. A branch of female tree in flower (life size.)
10. A 2-styled female flower.
11. A 3-styled female flower.
12. A lobe of stigma.
13. Transverse section of an ovary from a 2-styled flower, 2 cells, each with 2 ovules.
14. Transverse section of an ovary from a 3-styled flower.
15. Vertical section of an ovary showing the very large placentas lobed over the upper portion of the pendulous ovules. (All the above drawn from fresh specimens.)

Figures 16 to 20. Views of the fruit, seed and embryo, copied from Dr. Wight's drawing, as I have no fruit at hand.

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Dumphy Lith.

Aporosa Lindleyana (Wight.)

MACARANGA TOMENTOSA. (Nat. order Euphorbiaceæ.)

MACARANGA. *Thouars.*—GEN. CHAR. Diæcious, petals and disk 0. *Male*, calyx valvate, stamens 2-3 or numerous (but less than in Mallotus), rarely only 1 central, seated on the subconvex receptacle and irregularly verticellate, anthers 3-4-celled fixed by the back with the connective incomplete and shorter than the cells, no rudiment of an ovary. *Female*, calyx imbricate, ovary 1-6-celled cells 1-ovuled, fruit a capsule, seed not caruncnlate albuminous, cotyledons broad much longer than the radicle. Trees, leaves alternate peltate and palmatinerved, or lanceolate and penniveined, inflorescence very various glomerate or fasciculate or in axillary spikes, racemes or panicles. *Pet. Thouars Gen. Madagas. p.* 26 *t.* 88 ;—*DC. Prod.* xv. *p.* 987. Pachystemon, *Bl. Bijdr. p.* 626. Mappa, *Adr. Juss.* Adisca, *Zolling.* Mecostylis, *Kurz.* Pauhopia, *Noronha.* Claoxyli sp., *Wight.* Osyris sp., *Roxb.*

Section EUMACARANGA.—Anthers 4-valved, ovary 1-celled.

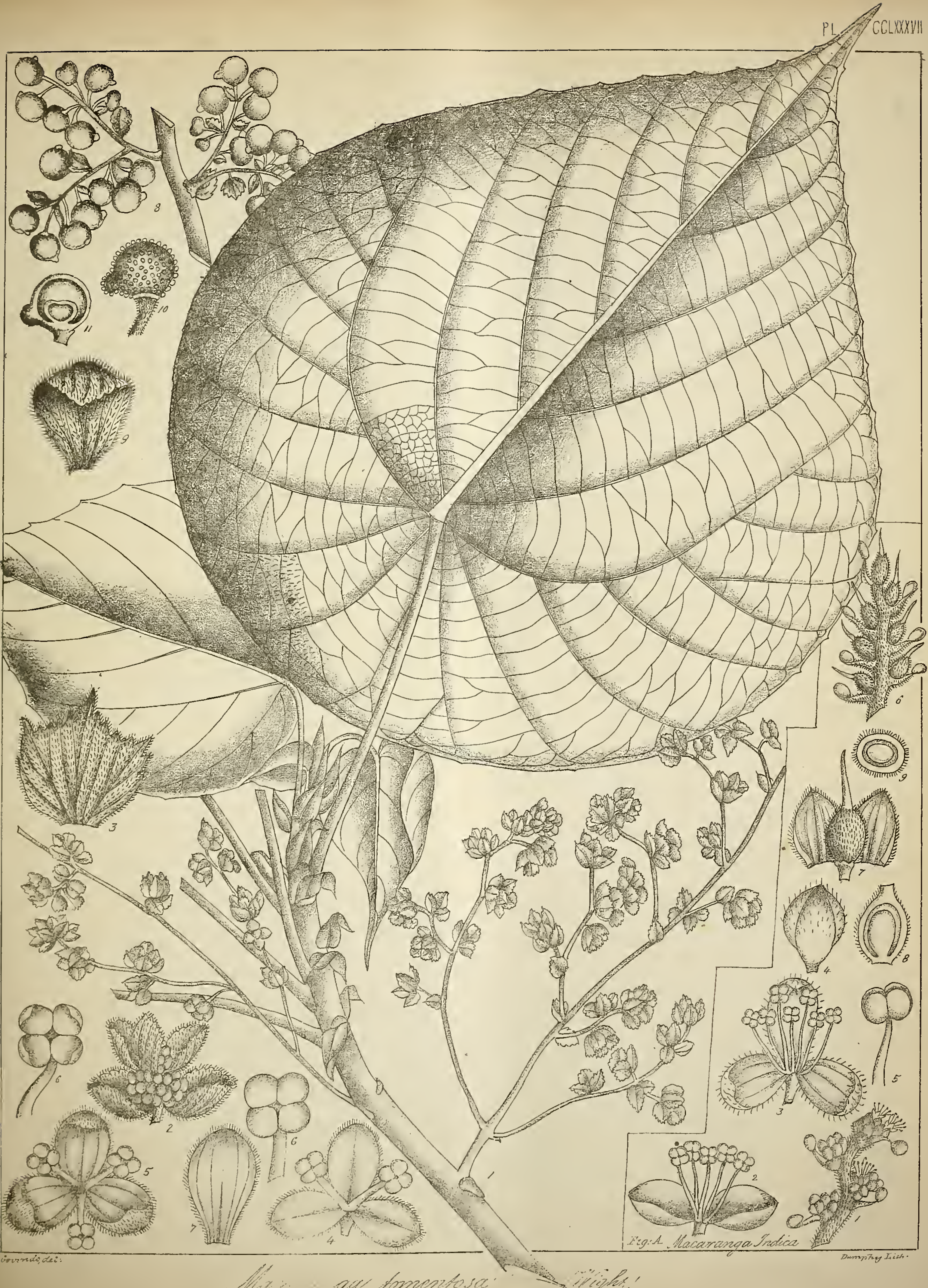
MACARANGA TOMENTOSA. (Wight.) A small or middling sized tree, the young parts more or less densely stellato-tomentose, leaves orbicular with a longish acumination, subentire or with minute teeth at the excurrent veins, peltate, scarcely coriaceous, in age subglabrous above except the costa and primary veins which are mealy-puberulous, more or less tomentoso or pubescent beneath and there furnished with numerous minute waxy dot-like glands, 6-8 inches long by nearly as broad, palmately 9-nerved at the insertion of the petiole, pinnately veined above, veinlets parallel very regular and prominent, petiole 2-5 inches long terete, stipules largo triangularo-ovate acuminate tomentose. *Male*, panicles axillary and from the old axils from a little shorter to nearly as long as the leaves, much branched, flowers in interrupted sessile heads, bracts 2-2½ lines long tomentoso-ovate to obovate or 3-lobed dentate, venose many flowered, calyx deeply 3-lobed, lobes cuneate obovate hairy on the outside, filaments 2 or 3 free about as long as the calyx. *Female*, panicles much shorter than in the male and less compound, bracts as in the male but rather smaller 1-2 flowered, pedicels 2-3 lines long; calyx subentire, ovary subglobose, much incurved, stigma subovoid obtuse lateral, capsule globose scarcely 3 lines in diameter densely covered with waxy dot-like glands, seed globose subscrobiculate, testa crustaceous. *Wight Icones tab.* 1949. *fig.* i. *& fig* ii. *No.* 9 ;—*DC. Prod.* xv. *p.* 1010.

A very common tree in all our western forests and in Bombay and Ceylon, generally affecting old clearings of forest and often planted for shade by coffee planters; called Vatte Kanni in Tamil, Upligi and Upalkai in Canarese (S. Canara), Chenthakanni in Mysore (Canarese), Chanda in the Bombay Presidency, and Kanda in Ceylon; a gum exudes from the tree which is used medicinally by the natives and for taking impressions; the timber is soft and useless, the tree is of very rapid growth.

Analysis.

1. A branch of male tree in flower.
2. The flowers and bracts.
3. A 3-lobed bract.
4. A flower with 2 stamens, calyx 3-lobed
5. A flower with 3 stamens, calyx 3-lobed.
6. The 4-celled anther.
7. A lobe of the calyx. (All drawn from living specimens.)
8. Portion of a branch of a female tree in fruit.
9. A bract from the female panicle.
10. A female flower rather advanced, stigma lateral, ovary and stigma covered with glands.
11. The same cut vertically showing the single cell and solitary erect ovule. (Drawn from dried specimens.)

Fig. A. Dissections of M. Indica. (See Manual.)



Govindoo del. Dumphy Lith.

Ma[illegible]ga tomentosa Wight.

DAPHNIPHYLLUM ROXBURGHII. (Nat. order Euphorbiaceæ ?)

DAPHNIPHYLLUM. *Blume.*—GEN. CHAR. Diœcious. Calyx very small 3-8 parted, petals 0 or rudimentary. *Male,* stamens 5-12, anthers 2-celled dehiscing longitudinally ovate thick on very short filaments radiating from a central disk. *Female,* ovary ovoid incompletely 2-celled with 2 pendulous ovules in each cell. Styles 2 united at the base shortly recurved undivided, stigmas papillose, berry ovoid indehiscent, seed solitary, embryo minute at the apex of a thick fleshy albumen, radicle superior. Trees or shrubs, leaves alternate on long petioles entire coriaceous, flowers in axillary or lateral racemes. *Blume.* Goughia, *Wight Icones* 1879. Gyrandra, *Wall.*

DAPHNIPHYLLUM ROXBURGHII. (Baillon.) A good sized glabrous tree, leaves oblong or subobovate generally obtuse or retuse with a small mucro, more rarely acute or acuminate very coriaceous, 3 to 4½ inches long by 1½-2 broad, dark shining green above glaucous beneath, petioles 1-1½ inches long channelled above, racemes axillary from a little shorter to a little longer than the petioles. *Male,* calyx minute and soon deciduous but exceeding the filaments, stamens about 8. *Female,* calyx 5-6 parted, the segments very unequal, generally 2-3 nearly equalling the ovary, the others very small, rudimentary, petals 2-5 or altogether wanting, irregular and unequal opposite or alternate with the segments of the calyx, styles short spreading, ovary glaucous, drupe oblong about ½ an inch long crowned with the remains of the styles, nut hard and rugged. *Baillon. Euph.* 565. Goughia Neilgherrense, *Wight Icones tab.* 1878-79.

A very common tree on the Nilgiris, Pulneys, and Anamallays, and other mountains on the west side of the Presidency, and in Ceylon at elevations from 4000 *feet upwards, also indigenous in Hong-kong, Loochoo, Corea and in Japan ; called Nir-chappay by the Burghers on the Nilgiris ; the wood is very inferior but makes excellent fuel. Its foliage makes it highly ornamental for shrubberies, &c.*

Analysis.

1. Branch of female tree in flower and fruit.
2. A female flower.
3. A 6-parted calyx opened, no petals present.
4. A 5-parted calyx opened, showing the presence of 5 rudimentary petals.
5. Ovary cut vertically, ovules pendulous.
6. Ovary cut transversely, incompletely 2-celled, the cells 2-ovuled.
7. Ripe fruit cut vertically.
8. The hard putamen or nut.
9. The embryo.

10, 11, 12. Branch of male tree and male flowers, copied from Dr. Wight's drawing. Nos. 1 to 9 drawn from living specimens collected on the Nilgiris.

Govindo, del. Dumphy Lith.

Daphniphyllum Roxburghii (Baillon)

MALLOTUS PHILIPPINENSIS. (Nat. order Euphorbiaceæ.)

MALLOTUS, *Lour.*—GEN. CHAR. Diœcious or rarely monœcious, calyx 2-5 cleft, valvate, petals none, disk none or very rarely present in the female flower. *Male,* stamens numerous central free or shortly united at the base, anthers 2-celled, rudiment of ovary none, or rarely a minute one present. *Female,* ovary 3-(or rarely 2-5-) celled, cells 1-ovuled, styles as many as the ovary cells, simple recurved usually densely plumose on the inner side, capsule dividing into 3 (or rarely 2-5) cocci, seed ecarunculate, albumen copious, cotyledons broad, radicle short. Trees or shrubs, leaves alternate or opposite 3-5 nerved at the base bistipulate entire toothed or lobed, usually with 2 depressed glands at the base, flowers in racemes or spikes terminal or very rarely axillary. *Lour. Fl. Cochinch. p.* 781. Rottlera, *Roxb.* Echinus, *Lour.* Elateriospermum, *Blume.* Melanolepis, *Reichenb.* Boutonia, *Boj.* Cordemoya, *Baill.* Adisca, *Bl.* Echinocroton, *Mueller.* Hancea, *Seem.* Axenfeldia, *Baill.* Plagianthera, *Reichenb.*

MALLOTUS PHILIPPINENSIS. (Lam.) A middling sized tree, young branches minutely hoary tomentose, leaves oblongo-elliptic to ovate obtuse or with a long acumination, 3-6 inches long entire rather coriaceous, glabrous above except when young minutely hoary tomentose or often glaucous beneath and there furnished with minute red glands 3-nerved at the base, furnished at the base on the upper side with 2 depressed glands, petioles ½-2 inches long terminal at the apex, spikes axillary and terminal dense and paniculate in the male, generally solitary in the female, 3-4 inches long, bracts triangular ovate acute 3-flowered in the male and 1-flowered in the female, flowers small, calyx hoary tomentose and furnished with red glands, stamens about 26, anthers glandular, styles shortly united with plumose recurved branches, capsule 3 coccous, each of the cocci the size of a small pea, covered with red glandular tomentum. *DC. Prod.* xv. 980. Croton Philippinensis, *Lam. Ency. vol.* 2, *p.* 206. C. punctatus, *Retz.* C. coccineus, *Lam.* C. montanus, *Willd.* Rottlera tinctoria, *Roxb. Fl. Ind.* iii. *p.* 827. R. aurantiaca, *Hook. et Arn.* R. affinis, *Hassk.*

This tree is common throughout the Madras presidency, and in Bengal, Bombay, Birmah, Ceylon, &c., and it is also found in Java, the Philippines, Australia and Hongkong. In Southern India it ascends the mountains to about 5000 *feet, but is also common in the forests of the plains ; the wood is occasionally used by the natives for ordinary purposes, and the bark is in use for tanning. The red mealy powder off the capsules is a valuable product and might be a source of considerable revenue in many of our forest districts; it is used as an orange dye principally for silk. The ripe capsules are gathered in March and rubbed together or shaken in bags till the farina separates. It is known as Kapli or Kamila powder, and the silk dyers use the following method :—*4 *parts of the powder,*1 *part of powdered alum,* 2 *parts of salts of soda, rubbed well together with oil of Sesamum and then boiled in water ; it is sufficient however to mix it with water containing* ½ *its weight of carbonate of soda. The powder is much adulterated in our bazaars, but some collected carefully by the Forest Department, realized a high price in the English markets. The tree is called Kapli almost throughout this Presidency, and is known by the names of Kameel and Kamila in Hindoostani ; and in Ceylon it is called Hamparandella, and in Bombay Shendree ; the powder is also supposed to be of value as a vermifuge.*

Analysis.

1. A portion of the male inflorescence magnified.
2. A male flower bud, calyx 4-cleft, segments valvate.
3. The same more advanced, showing the red glandular dots.
4. A full flower, stamens central about 26, no petals, or disk, or abortive ovary.
5. Anthers, front and back view, showing the glandular dots.
6. Female flower.
7. Calyx.
8. Ovary cut vertically, ovules pendulous.
9. A style very highly magnified.
10. Ovary cut transversely, 3-celled, cells 1-ovuled.
11. A capsule.
12. Lower portion of a leaf upper surface, showing the 2 glands at the base. (All drawn from living specimens.)

Mallotus Philippinensis. (Lam.)

MISCHODON ZEYLANICUS. (Nat. order Euphorbiaceæ.)

MISCHODON, *Thw.*—GEN. CHAR. Diœcious, calyx of both sexes imbricate 6-(rarely 4-5-) parted, petals wanting or 1-4 present much smaller than the calyx-lobes. *Male*, stamens 6 (rarely 4-5-7) inserted round the base of the 3-lobed rudiment of an ovary, which is imbedded in the disk; filaments elongate free at the base opposite the calyx-segments when equal in number, anthers 2-celled dehiscing longitudinally (cells at length divaricate) affixed nearly at the apex. *Female*, disk thick annular more or less lobed conspicuous, ovary 3-(rarely 4-) lobed, 3-(rarely 4-) celled, cells 2-ovuled, the ovules pendulous from a thick placenta, stigmas subsessile as many as the cells of the ovary connate at the base, dilated at the apex, somewhat recurved simple or somewhat 2-lobed, capsule 3-(rarely 4-) coccous, seeds ovoid slightly compressed ecaruuculate and exarillate, solitary in the cells, furnished with a conspicuous hook at the apex, testa smooth castaneous, cotyledons oblong, radicle short. A tree, leaves opposite or 3-5-verticellate penniveined entire, flowers small in axillary panicles. *Thw. in Hook. Kew Journ. of Bot.* 1854, *p.* 299, *t.* 10-*B*.

MISCHODON ZEYLANICUS. (Thw.) A large tree, young branches tetragonous minutely pubescent, leaves glabrous except when very young, 3-5-verticellate, entire oblong obtuse or emarginate at the apex, narrow towards the base, 4-15 inches long by 1-5 inches broad, minutely reticulated; petioles pubescent $\frac{1}{4}$ to $1\frac{1}{2}$ inch long. *Male*, panicles pubescent axillary about 3 inches long bracteated, the glomerules many-flowered, pedicels short, stamens about 3 times as long as the calyx, filaments and anthers hairy, female panicles or racemes shorter than the male but somewhat elongating in fruit, ovary hairy, capsule glabrous 10-15 lines in diameter, seed brown, hooked at its apex. *Thw. l. c.*;—*DC. Prod.* xv. *p.* 1124. (Wrong as to the number of the ovules.)

This fine tree is common in Ceylon in the vicinity of Colombo and near Kandy; the young leaves are of a beautiful red color; it is known by the name of Tamana. The timber is excellent. It seeds abundantly, and is most readily propagated from seed, and has been introduced into this presidency. I do not know that it occurs in our southern provinces, but I have a specimen of doubtful origin.

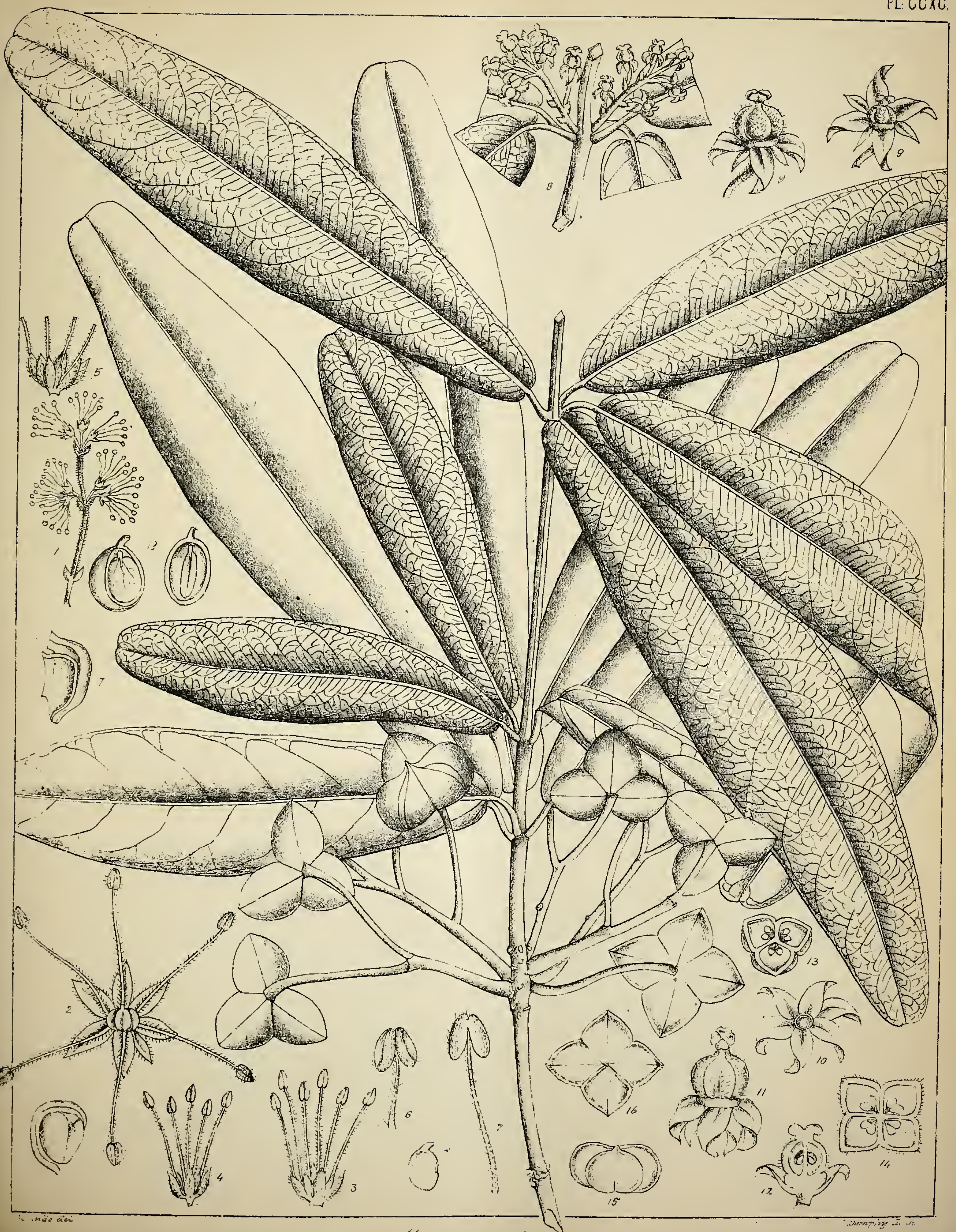
Analysis.

The figure represents branch of female tree in fruit.

1. Portion of a male panicle magnified.
2. A male flower open, showing 6 sepals and 1 petal, 6 stamens each opposite one of the sepals, and the abortive 3-lobed ovary.
3. Male flower, side view, showing 6 stamens.

4, 5. Male flowers with 4-5 stamens.

6. Anther, front view, cells somewhat divaricate, filament and anther-cells hairy.
7. Anther, back view, filament attached nearly at the apex at the back.
8. Female inflorescence.
9. Female flowers, petals sometimes present, ovary 3-lobed seated on a thick disk, styles short thick recurved.
10. A 6-cleft female calyx open.
11. Female flower with a 4-lobed ovary and 4 styles.
12. Ovary cut vertically, ovules 2 in each cell attached to a thick placenta pendulous from rather above the apex of the axis.
13. Ovary cut transversely, 3-celled, each cell 2-ovuled.
14. A 4-lobed ovary cut transversely.
15. A fruit with 3 cocci.
16. A fruit with 4 cocci.
17. Valves of the fruit after it has burst.
18. A seed showing the hook at the apex.
19. Seed cut vertically, showing the embryo lying in albumen. (All drawn from flowers in spirits.)



Mischodon Zeylanicus Thw.

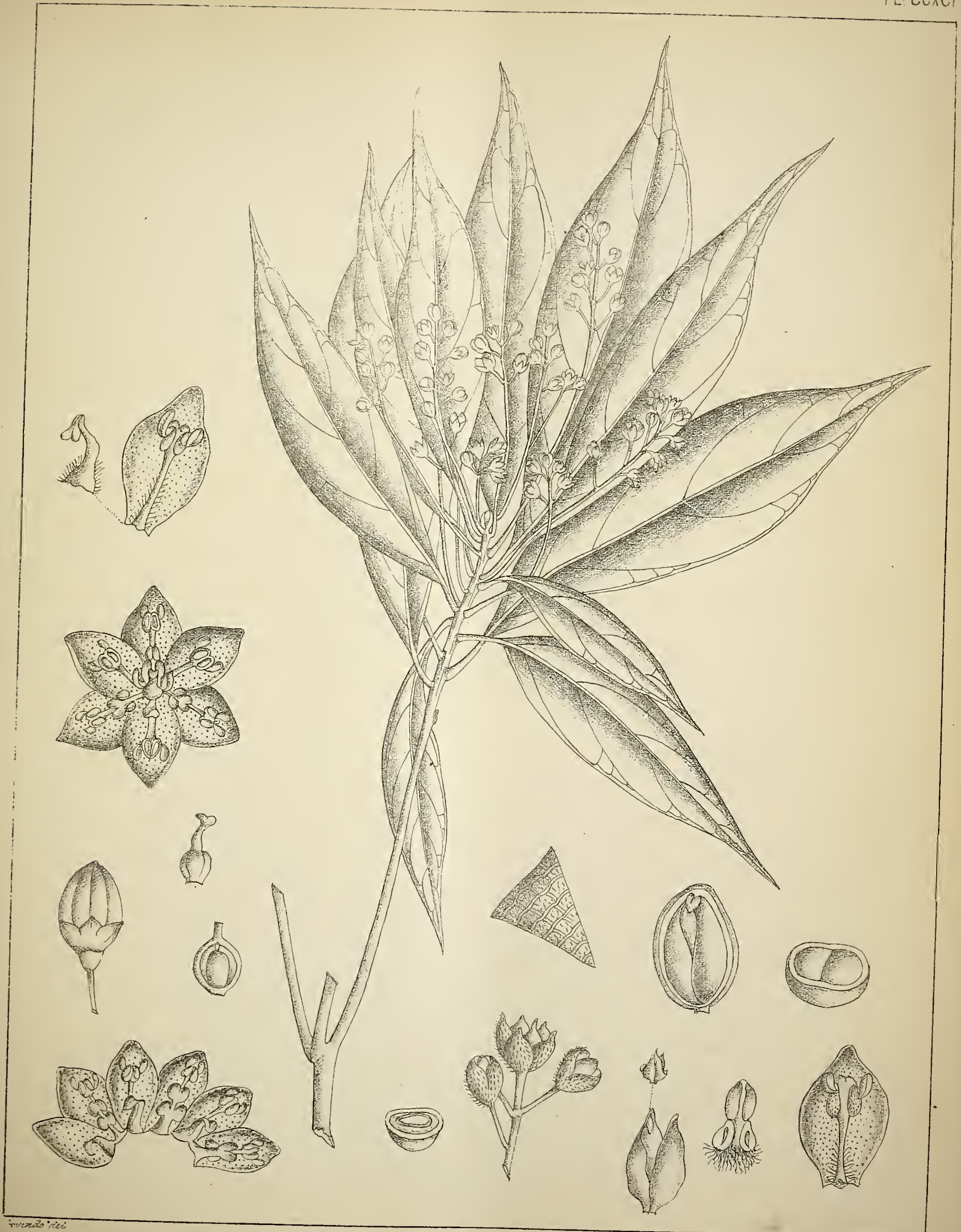
APOLLONIAS ARNOTTII. (Nat. order Laurineæ.)

APOLLONIAS, *Nees.*—GEN. CHAR. Flowers hermatbrodite, calyx infundibuliform 6-cleft persistent, lobes subequal. Stamens 9 fertile, filaments filiform, the 3 inner ones furnished with 2 stipitate glands at the base, anthers oblong all 2-celled, the 6 outer introrse, the 3 inner extorrse ; staminodes 3. Style short, stigma depresso-subcapitate, berry oval surrounded at the base by the 6-lobed enlarged hardened calyx. Trees, leaf-buds naked, leaves penniveined, panicles axillary and subterminal, flowers small naked.

This genus differs from Phœbe in its 2-celled anthers, and from Hassia in its persistent calyx.

APOLLONIAS ARNOTTII. (Nees.) A good sized tree, young parts adpressedly sericeo-puberulous, leaves chartaceous lanceolate or oblongo-lanceolate attenuated at both ends much acuminated, delicately immerso-reticulated and somewhat prominently ribbed, glabrous and shining above, sparingly puberulous beneath, $2\frac{1}{2}$-$5\frac{1}{2}$ inches long by $\frac{3}{4}$-$1\frac{1}{4}$ inch broad, petiole slender 3-5 lines long, panicles 1-2 inch long sparingly puberulous or at length glabrous racemiform, branchlets generally 1-flowered, berry about $\frac{1}{2}$ an inch long. *Nees* ;—*DC. Prod.* xv. *p.* 65 ;—*Wight Icones tab.* 1819.

This tree is found on the Tinnevelly and Travancore ghats, and in Malabar. The figure is copied from Dr. Wight's Icones, as I have mislaid my specimens ; it has quite the appearance of Phœbe lanceolata, but that genus has 4-celled anthers. The timber is quite unknown, but would probably be of superior quality.



...rendo del.

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Apollonias Arnottii. Nees.

PHŒBE WIGHTII. (Nat. order Laurineæ.)

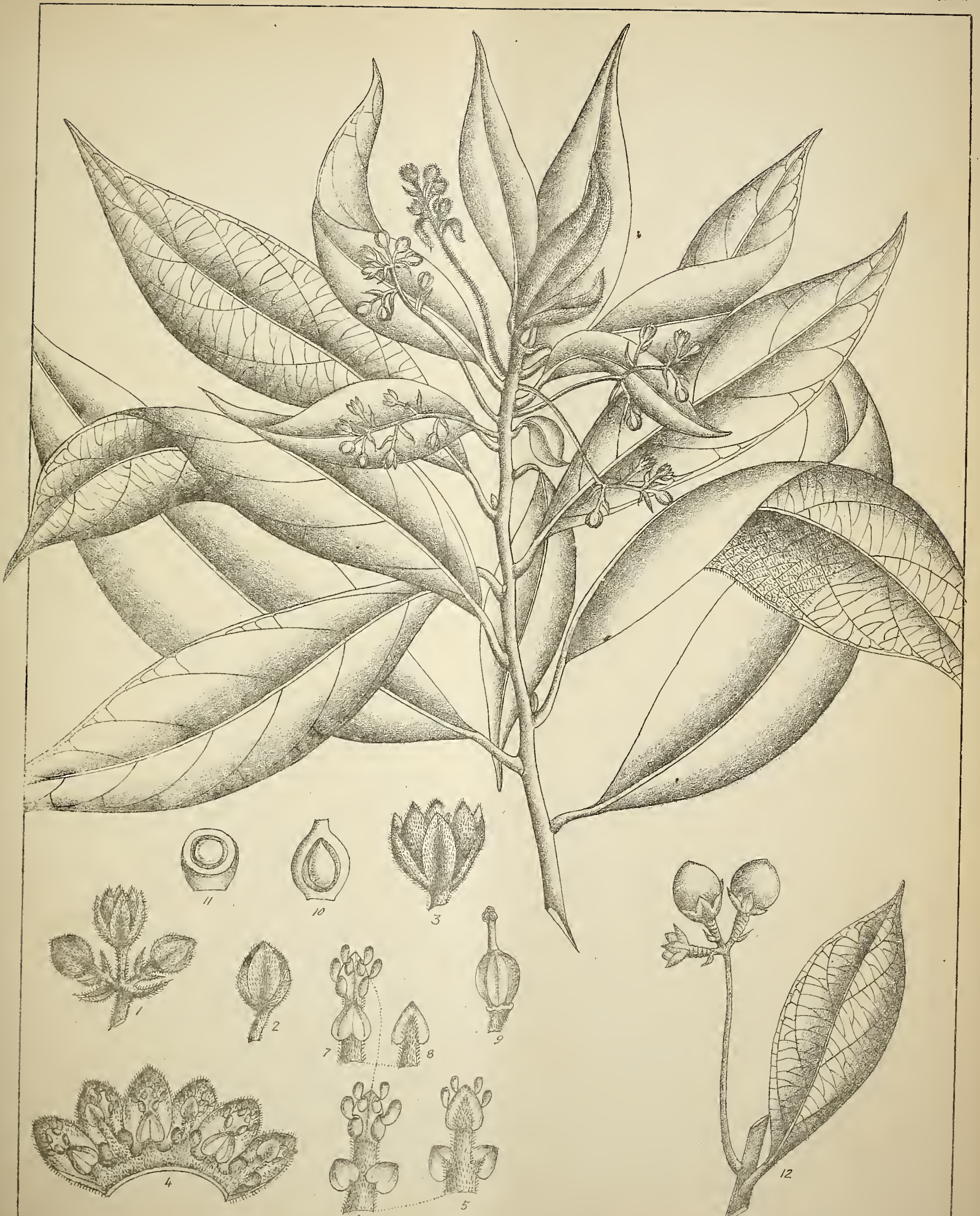
PHŒBE, *Nees.*—GEN. CHAR. Flowers hermathrodite, calyx infundibuliform 6-cleft, lobes subequal persistent with the hardened tube, fertile stamens 9, filaments filiform, the 3 inner ones each furnished with 2 glands at their base, anthers ovate all 4-celled, the 6 outer introrse, the 3 inner extrorse, staminodes 3 stipitate cordate at the apex. Style filiform, stigma angulato-discoid, berry seated on the cup-like 6-cleft persistent calyx which is supported by the more or less thickened pedicel. Trees, leaves alternate or subverticelled, penniveined or (in species not Indian) 3-nerved, flowers naked in axillary or terminal subcymose panicles.

PHŒBE WIGHTII. (DC.) A good sized tree, branchlets tawny pubescent, leaves coriaceous oblong obovate or elliptic acute or acuminate, above glabrous in age (except sometimes the impressed costa and veins) and somewhat shining, beneath tawny pubescent, penniveined, the veins much raised beneath, the veinlets prominently reticulated beneath but invisible above, 2-5 inches long by 1-2$\frac{1}{4}$ inches broad, petioles tawny 3-6 lines long, panicles tawny-pubescent axillary shorter than the leaves racemiform or sparingly branched, branchlets 3-flowered, flowers hoary, fruit-calyx much enlarged. *DC. Prod.* xv. 38. Phœbe lanceolata, *Wight Icones tab.* 1820 (not *Nees.*)

This tree is very common about Ootacamund and the higher ranges of the Nilgiris, and in many other localities along our Western Ghats at considerable elevations, but it is absent from Ceylon. It is in flower and fruit all the year round. The tree is called Kumara by the Burghers on the Nilgiris ; it yields a good dense wood of a light red colour, which is in use for various purposes with the natives.

Analysis.

1. Portion of the raceme.
2. Flower buds.
3, 4. A full flower opened out and the ovary removed, calyx 6-fid, stamens 9, the 6 exterior with 4-celled introrse anthers, the 3 interior with 4-celled extrorse anthers, and with 2 glands at the base; staminodes 3 stipitate opposite alternate exterior stamens.
5. Inside view of one of the 3 interior stamens, showing the two glands at its base and its extrorse anthers.
6. Outside view of the same.
7. One of the alternate stamens of the outer row with the staminode in front of it, anthers introrse.
8. A staminode.
9. Ovary, style and stigma.
10. Ovary cut vertically.
11. Ovary cut transversely.
12. Portion of a branch in fruit, the berry seated in the persistent calyx with the pedicel thickened. (Drawn from living specimens.)



Govindo, del. Dumphry, Lith.

Phœbe Wightii (DC.)

TETRANTHERA WIGHTIANA. (Nat. order Laurineæ.)

TETRANTHERA, *Jacq.*—GEN. CHAR. Flowers diæcious. Perianth-segments 6, equal or nearly so, or rarely unequal or fewer by abortion. Stamens of the outer series usually 6, perfect, of the inner series either 6 perfect, or 3 perfect alternating with 3 staminodia, or the whole number more or less increased; anthers all introrse, or the inner ones sub extrorse, 4-celled; glands usually 6, one on each side of 3 inner stamens, the stamens reduced to staminodia in the female flowers, but the glands usually present. Ovary imperfect or wholly abortive in the males, free in the females; stigma usually dilated and toothed or lobed. Berry resting on the more or less enlarged flat concave or cup-shaped perianth-tube, the segments deciduous. Trees, leaves alternate or rarely irregularly opposite penuiveiued. Flowers in cymes reduced to small umbels, heads or clusters within an involucre of 4 concave deciduous bracts arranged in short racemes or clusters in the axils or at the leafless nodes.—Cylicodaphne, *Nees;—Benth. Fl. Aust.* v. 304.

TETRANTHERA WIGHTIANA. (Wall). A good sized or large tree, branchlets compressedly angular at the apex, fusco-tomentose; leaves rigidly coriaceous elliptic or oval or obovate-oblong obtuse or acute, above green and glabrous except the costa, the veins impressed, the veinlets obscure, beneath rather densely tomentose and glaucous or sub-glabrous, the veins and veinlets very prominent and much raised, 3-8 inches long by 1-3 inches broad, petioles 3-8 lines long; racemes 1-3½ inches long floriferous nearly to the base hoary or fusco-puberulous; involucre 4-5 leaved 4-6 flowered, when closed 3-4 lines, when open 5-6 lines in diameter, the inner leaves of the involucre and calyx silky; stamens pilose at the base; berry oval, nearly ½ an inch long, half immersed in the cup-shaped enlarged truncated tube of the calyx. *Wall. List. N.* 2557. Cylicodaphne Wightiana, *Nees;—DC. Prod.* xv. 200;—*Wight Icones tab.* 1833.

Vary α. *tomentosa*—Leaves densely fulvo-or fusco-tomentose beneath.

Vary β. *glabrescens*—Leaves sparingly puberulous or glabrous beneath.

A handsome tree, common in many of our western forests from Canara down to Cape Comorin, from about 2000 *feet elevation up to about* 8000; *it is very abundant on the Nilgiris, where it is called Keynjee by the Burghers. The wood is yellowish, with a satiny appearance, and a darker heart; it is used for rafters and various other purposes.*

Analysis.

The plate represents the male and female trees.

1. An involucre of male tree in young state.
2, 3. Involucre of male flowers.
4. A male flower opened, 12 stamens, the 6 outer introrse, the 6 inner subextrorse and furnished with 2 glands at the base.
5. 2 stamens, one of the outer and one of the inner series, with the 2 glands at the base of the latter.
6. The abortive ovary.
7. An involucre of the female tree in young state.
8. An involucre of flowers.
9. A flower bud.
10. A female flower opened out, stamens 12 sterile.
11, 12. The sterile stamens.
13. Ovary, style and stigma.
14. Ovary cut vertically.
15. Fruit, the berry semi-immersed in the cup-like tube of the calyx. (Drawn from living specimens.)

Gov.ndo del.

Tetranthera Wightiana (Wall.)

LITSÆA ZEYLANICA. Nees. (Nat. order Laurineæ.)

LITSÆA, *Juss.*—GEN. CHAR. Flowers diœcious, calyx 4-6 parted, lobes subequal. *Male,* stamens 6, the 2 interior ones with 2 glands at the base, anthers all 4-celled and introrse. Staminodes none. *Female,* sterile stamens 4-6 ligulate or spathulate, the 2 or 3 inner ones furnished with glands on both sides at the base. Style filiform. Stigma discoid. Berry resting on the flat sometimes dilated perianth-tube, the segments persistent or deciduous. Trees or shrubs, leaves alternate frequently crowded and almost whorled at the ends of the shoots, usually penniveined but with few primary veins and the lowest pair more prominent so as often to appear triplinerved. Flowers in sessile or nearly sessile clusters, surrounded by several very deciduous imbricate bracts.

LITSÆA ZEYLANICA. (Nees.) A large tree, the branches and inflorescence quite glabrous or scarcely hoary with a very minute tomentum. Leaves ovate-elliptical or elliptical-oblong acuminate, contracted at the base, 3 to 5 inches long, glabrous and green above, white or glaucous underneath, penniveined but with few primary veins, the lowest pair more prominent than the others. Flowers in sessile clusters in the axils or at the old nodes, on pedicels of 1 to 2 lines, usually glabrous as well as the perianths. Perianth-segments ovate oblong obtuse. Filaments exserted, with a few hairs about the base ; glands of the two inner ones stipitate. Berry globular or slightly ovoid, resting on the persistent perianth-tube, expanded into an entire or slightly angular flat disk of 2½ to 3 lines diameter, the segments entirely deciduous. *Meissn. in DC. Prod.* xv. i. 226 ;—*Wight Ic. t.* 132 *and* 1844 ;—*Benth. Fl. Aust.* v. *p.* 307. L. foliosa, *DC. Prod.* xv. 222. L. scrobiculata, *DC. l. c. p.* 223. L. umbrosa et consimilis, *DC. l. c. p.* 223.

This tree is most abundant on the Nilgiris at 6000-7000 *feet elevation, and is found throughout our Western Ghats at elevations above* 2000 *feet, and it is equally common in Ceylon, where it is called Dawal-kooroondoo. Its wood is in use for house-building purposes, planks, rafters, &c., it is yellowish in color, straight-grained and tough, and when fresh emits an odour of Sweet Briar ; it is called Belori by the Burghers on the Nilgiris.*

Analysis.

The figure represents a branch of the female tree.

1. A male flower.
2. The same open, calyx 4-parted, stamens 6, anthers all introrse and 4-celled, the 2 interior stamens with a pair of glands at the base. No staminodes.
3. One of the exterior and 1 of the interior stamens removed.
4. Abortive ovary.
5. Involucre of male flower.
6. Involucre of female flower.
7. A female flower.
8. The same open, 6 sterile ligulæform stamens, the 2 interior with glands.

9, 10. Sterile stamens removed from the flower.

11. Ovary cut vertically.
12. Fruit. (Drawn from living specimens.)

...rendo. del:

Litsaea Zeylanica (Nees)

ACTINODAPHNE SALICINA. (Nat. order Laurineæ.)

ACTINODAPHNE, *Nees.*—GEN. CHAR. Flowers diæcious, calyx 6-4-fid, the lobes subequal deciduous. *Male*, stamens 9-6, the 3-2 inner ones each furnished with 2 sessile or stipitate glands at the base, anthers oblong all 4-celled and introrse. Staminodes none, an abortive rudiment of an ovary. *Female*, sterile stamens 9, (rarely only 6) ligulæform, the 3(-2) inner ones furnished with 2 glands above the base, style filiform, stigma discoideo-sublobate ; berry seated on the persistent cup-shaped or rarely flat truncate base of the calyx. Trees or shrubs, flowers without any involucres entire in sessile clusters surrounded by imbricate scales or in racemes or panicles.

ACTINODAPHNE SALICINA. (DC.) A middling sized tree, young parts sericeous, branchlets verticelled, leaves in verticels of 5-8 together, slightly coriaceous lanceolate acute at both ends, glabrous in age except often the costa beneath, sericeous round the margins when young, very glaucous beneath, veins obscure, minutely scrobiculato-reticulated on both sides (under the lens), 2½-5 inches long by 5-12 lines broad, petiole 3-6 lines long, fascicles subsessile 3-8 flowered sericeous, pedicel in fruit 4 lines long, berry 4 lines in diameter. *DC*, *Prod.* xv. *p.* 212.

This tree is rare on our Western Ghats. I have only detected it in South Tinnevelly. Dr. Wight found it on the Nilgiris, and it occurs in Ceylon ; the primary veins in my specimens are much fewer than described by DeCandolle, and I am not certain that this is his tree ; it is however closely allied to the Ceylon A. elegans, Thwaitesii, and stenophylla, and they are all probably only varieties of one species. I know nothing of its timber, but it would probably be of good quality.

Analysis.

1. Branch of a female tree in flower.
2. A flower bud (female.)
3. A female flower.
4. The same open, perianth 6-lobed, 9 ligulæform sterile stamens, the 3 inner each with 2 glands above the base, the outer glandless.
5. One of the inner row of gland-bearing sterile stamens.
6. One of the outer row of glandless stamens.
7. Ovary, style and stigma.
8. Ovary cut vertically.
9. Fruit, the berry seated in the cup-like truncate base of the calyx, the lobes having fallen away. (All drawn from flowers in spirits.)
10. Male inflorescence of Actinodaphne angustifolia.
11. A male flower of the same open, stamens 9 all with introrse 4-celled anthers, the 3 interior with two glands at the base of each.

del. Dunphy Lith.

Actinodaphne salicina

ACTINODAPHNE HOOKERI. (Nat. order Laurineæ).

For Gen. Char. see Pl. ccxcv.

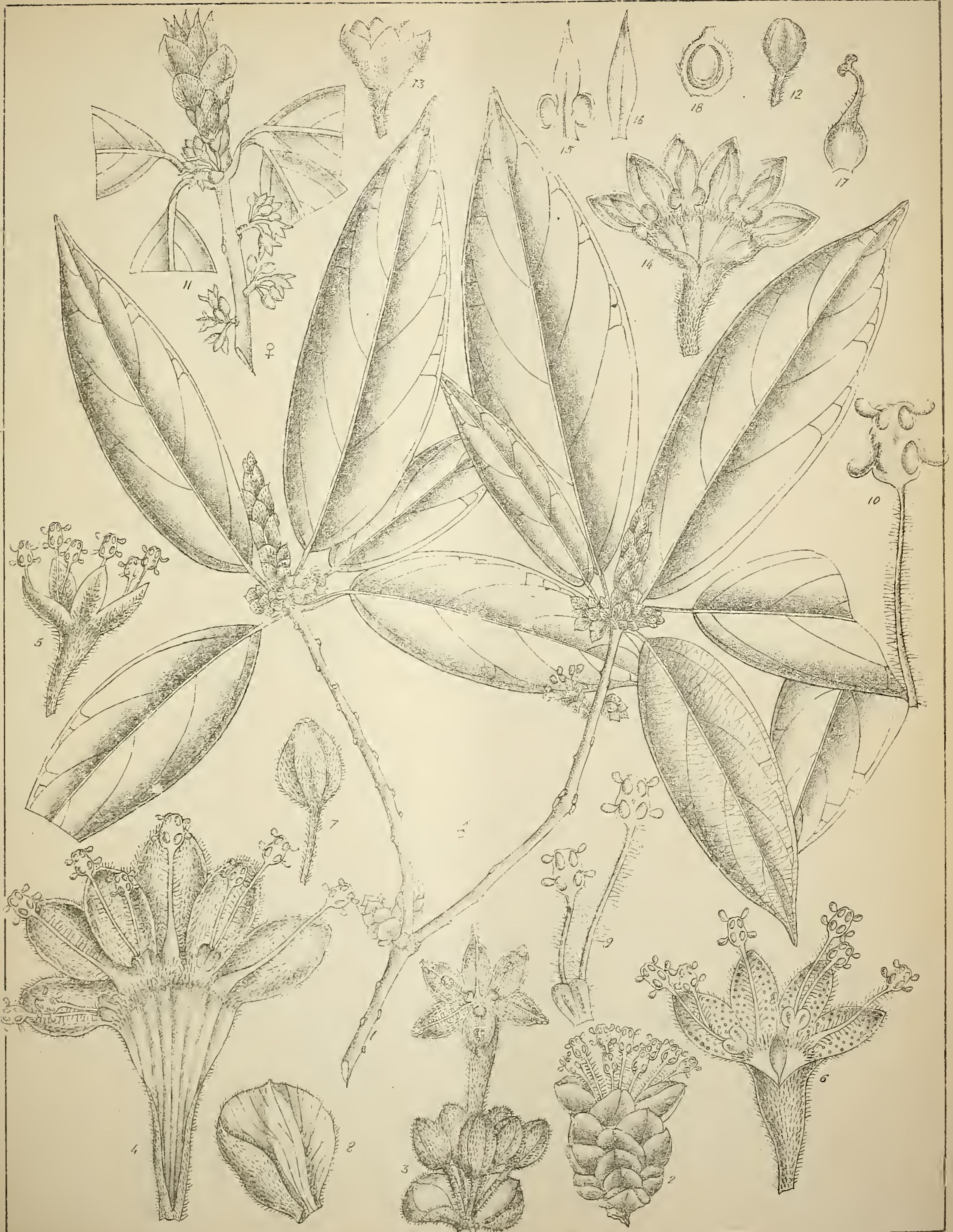
ACTINODAPHNE HOOKERI. (DC). A small or middling sized tree, young ramuli and leaves flavo-villous, leaves in verticels of 5-8 penniveined or more or less 3-nerved, coriaceous narrow lanceolate acute at both ends, quite glabrous in age, shining above, very glaucous beneath, 5-9 inches long by $1\frac{1}{4}$-2 inches broad, above scrobiculato-reticulate or punctate, the costa and veins obscure, beneath the costa and veins prominent and raised, petioles 3-8 lines long pulveraceous, fascicles subsessile lateral few-flowered, covered when young with suborbicular golden scales, pedicels 1-2 lines long. *DC. Prod.* xv. *p.* 218.

This tree is very common on the hills on the eastern side of the presidency (North Arcot, Cuddapah, &c.) where Laurineæ are very rare, but I never met with it in our western forests; it has however been found in Bombay and the Concan, and also in Sikkim. I am not acquainted with its timber.

Analysis.

1. Branch of the male tree in flower.
2, 3. Male inflorescence.
4. A 6-lobed male flower open, stamens 9, anthers all 4-celled and introrse, the 3 inner with 2 glands at the base.
5. A 4-lobed male flower.
6. The same open, stamens only 6, a small abortive ovary.
7. A male flower bud.
8. A bract or floral scale.
9, 10. Stamens.
11. Branch from the female tree in flower.
12. A flower bud.
13. A full flower.
14. The same open, 9 ligulæform sterile stamens, the 3 inner furnished with glands.
15. One of the inner row of sterile stamens.
16. One of the outer row of sterile stamens.
17. Ovary, style and stigma.
18. Ovary cut vertically. (All drawn from flowers in spirits.)

PL: CCXCVI



Govindo, del. Dump.ing Lith.

Actinodaphne Hookeri (D.C.)

ALSEODAPHNE SEMICARPIFOLIA. (Nat. order Laurineæ.)

ALSEODAPHNE, *Nees.*—GEN. CHAR. Flowers hermathrodite, calyx deeply 6-parted, lobes subequal deciduous from the base, fertile stamens 9, filaments filiform or dilated, the 3 inner furnished with 2 subsessile glands near the base; anthers ovato-oblong 4-celled, those of the 6 outer stamens introrse, those of the 3 inner extrorse. Staminodes 3 stipitate cordate or sagittate at the apex. Style filiform, stigma discoid or obtusely subtrigonal, berry seated on the entire smooth base of the calyx, the pedicels thickened. Trees, leaves alternate coriaceous penniveined, inflorescence of Cinnamomum, outer segments of calyx usually shorter than the inner ones.

ALSEODAPHNE SEMICARPIFOLIA. (Nees.) A large tree, glabrous except the very young shoots, leaves obovate oval or ovate obtuse narrowed at the base, rounded at the apex, coriaceous glabrous and somewhat shining above, glaucous beneath, finely reticulated on both sides, 3-9 inches long by $1\frac{1}{2}$ to 4 inches broad, petiole 3-9 lines long, panicles axillary or from the old axils $2\frac{1}{2}$-10 inches long corymbosely branched towards the apex, calyx $1\frac{1}{2}$-2 lines long, lobes equal, fruit oblong 4-8 lines long by 3-5 lines broad, pedicel thickened 3-10 lines long. *Nees*;—*DC. Prod.* xv. *p.* 28;—*Wight Icones Pl.* 1826 27.

This tree is not uncommon on the Western Ghats of this presidency, from Canara down to Cape Comorin, up to 5000 feet elevation, and it also occurs in Ceylon. There are 2 different forms or varieties, one with the leaves 3-4 inches long, and the other with the leaves 6-9 inches long. I have not observed that the 2 forms run one into the other, and I have only met with the smaller leaved variety at the higher altitudes, so suspect that the difference is due to elevation. This tree is known in Ceylon under the names Weewarana, Raane (grainwood), and Yaverne, and is there known as a valuable timber; the wood is procurable of very large size, and is of a light yellow color, and is said not to warp; it is used for building and other purposes, and as it resists the attacks of the teredo, is much in use in the construction of boats; it is exported from Trincomallee.

Analysis.

The figure represents the smaller leaved form.

1. A flower bud.
2. A flower.
3. The same open, calyx 6-parted; fertile stamens 9, the 6 exterior without glands 4-celled introrse, the 3 interior with glands 4-celled extrorse. Staminodes 3, opposite alternate outer stamens.
4. One outer and 1 inner stamen, the former introrse, the latter extrorse and with 2 glands.
5. The alternate outer stamen with the staminode in front of it.
6. Ovary, style and stigma.
7. Ovary cut vertically.
8. Fruit-panicle of the larger leaved form, the berry seated on the thickened pedicel and base of the calyx. (All drawn from dried specimens.)

Govindoo del. Dunphy Lith.

Alseodaphne semicarpifolia, (Nees)

HAASIA WIGHTII. (Nat. order Laurineæ.)

HAASIA, *Blume.*—GEN. CHAR. Flowers hermaphrodite or by abortion monœcious, calyx rather fleshy 6-5 cleft wholly deciduous, lobes unequal, exterior ones generally small, stamens 9 or 7 fertile all 2-celled, the 6-5 outer ones introrse, the 3-2 inner ones extrorse and furnished at the base with 2 sessile glands. Staminodes 3 triangular subsessile, or wanting. Style filiform. Stigma discoid triangular. Berry oval naked seated on the thickened fleshy pedicel. Trees, leaves generally towards the apex of the branches, pennivained, panicles subterminal, flowers few small naked.

HAASIA WIGHTII. (Nees.) A good sized tree glabrous, leaves subopposite coriaceous elliptic acute at both ends rather shining, of the same color on both sides or a little paler beneath, finely reticulated, 4-6 inches long by $\frac{3}{4}$-$2\frac{1}{4}$ inches broad, petiole slender 4-9 lines long, panicles axillary 1-4 inches long, the branchlets 3-flowered, flowers hermathrodite, staminodes large and conspicuous pellucid-dotted, fruit-pedicel somewhat thickened 3-4 lines long, berry oblong $\frac{1}{2}$ an inch long. *Nees;—DC. Prod.* xv. *p.* 61;—*Wight Icones tab.* 1831.

This tree is not uncommon in the moist woods on the Tinnevelly and Travancore range of ghats at 2000-3000 *feet elevation, and I have specimens from the Anamallays from an elevation of* 4,000 *feet. Nothing whatever is known of the timber of this and many others of the Laurineæ, and it is important that Forest officers should pay atten tion to this order.*

Analysis.

1. Portion of a panicle shewing the bud and full flower.
2. A 6-parted full flower stamens 9, the 6 outer with 2-celled introrse anthers, the 3 inner with 2-celled extrorse anthers and with 2 glands at the base, staminodes 3.
3. A 5-parted flower opened out, outer stamens only 5, inner 2, staminodes 3.
4. A lobe of the perianth or calyx.
5. An outer introrse stamen.
6. A staminode.
7. An inner extrorse stamen with its 2 glands.
8. Ovary cut vertically.
9. Ovary cut transversely.
10. A fruit, the berry seated on the thickened fleshy pedicel, the calyx having fallen away.
11. Transverse section of the berry.
12. Vertical section of the same.
13. The seed. (All drawn from living specimens.)

Govindo, del.

Dunphy, Lith.

Haasia Wightii. (Nees)

CRYPTOCARYA WIGHTIANA. (Nat. order Laurineæ.)

CRYPTOCARYA, *R. Br.*—GEN. CHAR. Flowers hermaphrodite. Perianth-segments or calyx-lobes 6, equal or nearly so. Stamens of the outer series 6, all perfect with introrse anthers, of the inner series 3 with extrorse anthers, alternating with 3 short staminodia, glands 6 at the base of the inner perfect stamens or almost as near to the outer ones opposed to them. Anthers all 2-celled. Ovary immersed in the perianth-tube which after flowering closes over the ovary, and finally becomes more or less fleshy or succulent, completely enclosing and usually consolidated with the fruit, the limb of the perianth deciduous leaving a small scar at the apex, or rarely persistent. Trees or tall shrubs. Flowers small, in cymes arranged in axillary racemes or panicles, the upper ones often forming an apparently terminal panicle with the subtending leaves very small or deficient. Fruiting-perianths globular ovoid or oblong, having the appearance of inferior fruits.—Caryodaphne, *Blume*;—*Benth. Fl. Aust.* v. *p.* 294.

CRYPTOCARYA WIGHTIANA. (Thw.) A very large tree, young ramuli and leaves minutely puberulous, leaves rigidly coriaceous elliptic and oblong acuminate or acute at the apex, obtuse or acute at the base and often unequal, glabrous and shining above the costa sunken, veins obsolete, very glaucous beneath the costa and veins prominent, the veinlets much reticulated, 2·6 inches long by 1-2½ inches broad, petioles 3-9 lines long, panicles compound many-flowered covered with minute golden tomentum, 1½-4 inches long, fruit ovate-oblong or subspherical ½ an inch long shining black. *Thw. En. Pl. Zey. p.* 254. C. floribunda, *Wight Icones t.* 1829. (not *Nees*).

This fine tree is not uncommon in the moist forests of our Western Ghauts and in Ceylon at elevations from 2000 *up to* 5000 *feet. I have specimens from the Tinnevelly and Travancore Ghauts, Malabar and South Canara. In Ceylon it is called Golu-mora, and its timber is considered valuable for building purposes.*

Analysis.

1. A flower bud.
2. A flower.
3. A flower opened, calyx or perianth 6-parted, stamens 9 fertile, the 6 exterior with 2-celled introrse anthers, the 3 interior with 2-celled extrorse anthers and furnished with 2 glands at the base, staminodes 3.
4. One of the alternate outer introrse stamens with the inner extrorse one opposite it.
5. The same with the inner stamen removed.
6. The inner stamen, outside view.
7. One of the alternate outer introrse stamens with the staminode opposite it.
8. A staminode.
9. Ovary, style and stigma.
10. Ovary cut vertically.
11. A fruit berry quite enclosed in the enlarged persistent tube of the calyx.
12. The same cut vertically. (All drawn from living specimens.)

Covendo del. Dunphy, Lith.

Cryptocarya Wightiana (Thw.)

HERNANDIA PELTATA. (Nat. order Laurineæ; Sub order Hernandieæ.)

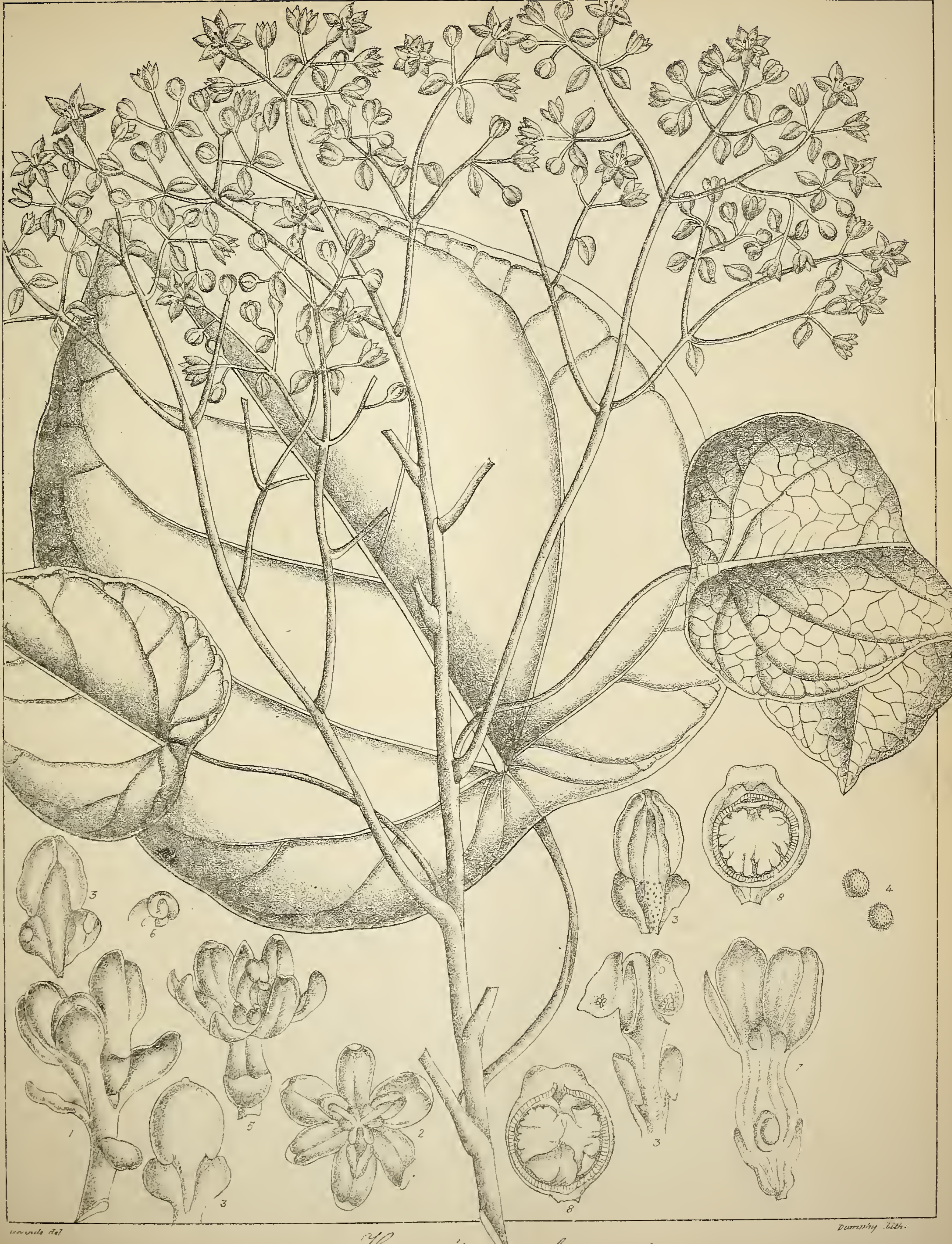
HERNANDIA, *Linn.*—Flowers monœcious. Perianth-segments in two rows, valvate in each row in the bud, 3 or 4 in each row in the males and 4 or 5 in the females. *Male flower.* Stamens as many as the outer perianth-segments and opposite to them, with a gland on each side at the base (or on one side only or none); anthers 2-celled, introrse, the valves separating laterally from the inner to the outer edge. *Female flower* inserted in a cup-shaped or lobed involucel. Glands or staminodia as many as outer perianth-segments and opposite to them. Ovary inferior, fleshy; style short, thick, with a dilated irregularly toothed or lobed stigma. Fruit somewhat fleshy or coriaceous, indehiscent, enclosed in the enlarged fleshy or thickly membranous involucel. Seed globular; testa thick and hard without albumen. Embryo with thick fleshy deeply-lobed cotyledons. Trees, leaves alternate, peltate or palmately nerved. Flowers in loose panicles on lateral peduncles at the ends of the branches, each branch of the panicle terminating in an involucre of 4 or 5 verticellate bracts enclosing 3 flowers, the central one female, sessile within the cup-shaped involucel, the 2 lateral ones males and pedicellate.

HERNANDIA PELTATA. (DC.) A large tree with a spreading head, glabrous or the inflorescence very slightly hoary-tomentose. Leaves on long petioles, broadly ovate, acuminate, peltately attached near the base, 5 to 9-nerved and remotely penniveined, the larger ones nearly 1 foot long, the upper ones much smaller. Panicles shorter than the leaves, the flowers almost clustered on the branches, one terminal female between two males within a whorl of 4 bracts, and sometimes one or two males lower down with a small bract under each pedicel. Male perianth slightly pubescent, the segments 3 in each row, almost petal-like, veined, about 2 lines long. Stamens 3, shorter than the segments with short filaments. Female flowers with a cup-shaped entire truncate involucel a little below the ovary and $1\frac{1}{2}$ lines long at the time of flowering, but soon enlarged and growing over the ovary or perianth-tube. Perianth-tube from the first completely adnate to the fleshy ovary, segments 4 in each row, the outer ones ovate 2 lines long, the inner ones narrow. Glands 4, large and nearly globular. Style villous, thickened upwards, with a dilated oblique irregularly lobed glabrous stigma, the whole style deciduous with the perianth-lobes. Fruit completely enclosed in the involucel which has become inflated globular smooth and fleshy, above $1\frac{1}{2}$ inches diameter, with a circular entire orifice of about $\frac{1}{2}$ inch diameter. Fruit about 1 inch diameter, more or less distinctly marked with 8 broad raised longitudinal ribs, with a raised terminal umbo. Seed very hard, about $\frac{3}{4}$ inch diameter. Embryo divided into 4 or 5 thick fleshy ruminate lobes. *Seem. Fl. Vit.* 205, *t.* 32;—*Benth. Fl. Aust.* v. *p.* 314.

This tree is common on the sea coast in Ceylon between Galle and Colombo, but I am not aware that it has been detected in the Peninsula; it also occurs in Australia, and extends over the sea coasts in the South-Pacific and Eastern Archipelago westward to the Mascarene islands, and northward to the Philippines and Loo Choo. The wood is very light and takes fire so readily from a flint and steel that it might be used as tinder. The juice is a powerful depilatory, removing the hair without any pain; the bark, seed and young leaves are cathartic; the tree is called Palatee in Ceylon.

Analysis.

1. Portion of the inflorescence.
2. A male flower, calyx 6 parted, stamens 3 each with 2 glands at the base.
3. Views of the stamens.
4. Pollen.
5. A female flower, calyx 8-parted, glands 4 inserted in the jaws of the calyx.
6. Stigma.
7. Vertical section of female flower and ovary shewing the single cell and the pendulous ovule.
8. Sections of the drupe shewing the large fleshy cotyledons and small superior radicle. (All communicated by Dr. Thwaites.)



Woods del. Dunsby lith.

Hernandia peltata. (D.C.)

NOTICE.

All the Plates of the work are completed with this Part; a supplemental part will shortly be sued completing the Manual, and giving Title-pages, Index, &c. &c. The work will then be ready r binding up in 2 volumes.

HELICIA ROBUSTA. (Nat. order Proteaceæ.)

HELICIA, *Lour.*—GEN. CHAR. Flowers hermaphrodite. Perianth regular, the tube slender, the laminæ small, the segments all much revolute when separating. Anthers on short filaments inserted a little below the laminæ, the connective produced into a short appendage. Hypogynous glands equal, distinct or united in a ring or cup round the ovary. Ovary sessile, with a long straight style, slightly thickened at the end with a terminal stigma; ovules 2, ascending laterally attached near the base. Fruit hard, nearly globular, indehiscent. Seeds either solitary and globular or two together and hemispherical; testa veined or rugose, cotyledons thick and fleshy. Trees or tall shrubs, leaves alternate, entire or toothed. Flowers pedicellate in pairs, in terminal or axillary simple racemes, the pedicels of each pair often more or less connate. Bracts very deciduous (or sometimes none ?)

HELICIA ROBUSTA. (Wall.) A good sized tree, young shoots rufo-pubescent, leaves oblong or obovato-oblong acute or obtuse acutely and coarsely serrate, sessile or very short petioled, thickly coriaceous, glabrous and very shining above, the veinlets prominent and densely reticulated, 5-8 inches long by 2-3 inches broad, racemes axillary or from the old axils or truncal 1-3 together, about 4 inches long rather densely flowered, peduncles about 1 line long furnished with a minute bract at the base, 2-flowered, pedicels about 3 lines long furnished with a small bracteole below the oentre, perianth 10-12 lines long greenish yellow fragrant soon splitting down into 4 revolute very narrow segments, previous to which the free segments at the apex are narrow-oval and about 1½ lines long, hypogynous glands connate into a 4-crenated cup, fruit about the size of a cherry. *Wallich List. n.* 2702. Rhopala robusta, *Roxb. Fl. Ind., Ed. Carey., vol.* i. *p.* 366. Helicia Travancorica, *Bedd. in Distrib.*

A very handsome tree, not uncommon on banks of streams on the Travancore and Tinnevelly mountains above Paupanassam at about 4000 *feet elevation, but not observed elsewhere in the presidency; it also inhabits Eastern Bengal and Birmah. The South-Indian form has smaller and more sessile leaves than the Bengal tree, but it answers too closely to the descriptions of that species to be considered specifically distinct. I know nothing of its timber or uses.*

Analysis.

1. Portion of a raceme highly magnified, peduncles 2-flowered, pedicels each with a small bracteole below the middle.
2. A flower, calyx or perianth 4-lobed, no corol, stamens 4
3. A flower bud.
4. A young flower.
5. Calyx opened, shewing the ovary and the hypogynous glands connate in a cup.
6. A segment of the calyx, shewing ths attachment of the anther near its apex.
7. Anther, front view.
8. Anther, back view.
9. Ovary, style and stigma, the hypogynons cup opened out.
10. Ovary cut vertically, 1-celled, 2 ascending ovules attached slightly above the base of the cell.
11. Ovary cut transversely.

12 & 13. Fruit and seed (not quite full grown.)

C. Vinõo, del.

Dunphy, Lith.

Helicia robusta (Wall.)

SALIX TETRASPERMA. (Nat. order Salicaceæ.)

SALIX, *Tourn.*—GEN. CHAR. Flowers diæcious, arranged in more or less lax aments. Scales lanceolate or concavo-rotundate or obovate, entire and glanduloso-crenulate towards the apex, torus glanduliform entire or ring-like or sub-cyathiform or in 2 gland-like bodies. Stamens 2-12, filaments filiform free or connate at the base, ovary glabrous or hairy often pedicellate, style elongate or obsolete entire or cleft, stigmas 2 thick short and entire or 2-lobed. Capsule 1-celled 2-valved, valves bearing the seeds near the base. Seeds 4-many erect comose, embryo exalbuminous orthotropal, radicle inferior. Large trees or shrubs, leaves alternate lanceolate to obovate, penniveined.

SALIX TETRASPERMA. (Roxb.) A large tree, leaves linear to ovato-lanceolate apiculate serrulate, shining above whitish below, membranaceous to coriaceous, 2-4 inches long by 1-1½ broad, aments peduncled or subsessile, the peduncles with or without leaves. *Male* aments yellowish, 2-5 inches long, sweet scented. Scales woolly, entire subrotund or oblongo-spathulate. Stamens 5-12, filaments free villous at the base, torus of 2 gland-like bodies. *Female* aments shorter than the male greenish, scales woolly spathulate glanduloso-crenulate, torus annular or suburceolate, ovary on a long stipe, style obsolete, stigmas 2, each 2-lobed. Capsule ovate, seeds 4. *Roxb. Fl. Ind.* iii. *p.* 753 ;—*Wight Icones tab.* 1954. S. ichnostachya, *Wight Icones tab.* 1953.

This tree is very common throughout this Presidency from sea level up to 7000 feet, and in Bengal, and it also extends to Java, but is absent from Ceylon; it is almost always found in the vicinity of water. I have never known the timber used for any purpose except firewood; it is said to be tough and elastic, and it weighs 37 lbs. the cubic foot. The tree flowers in January and February, and it is readily propagated from cuttings; it is called Walloonj or Bucha on the Bombay ghats, and Baishi in Hindostanee.

Analysis.

1. A branch of the male tree in flower (collected on the Anamallays, 4000 feet elevation.)
2. Branch of the female tree in young fruit (S. Canara plains, sea level.)
3. Magnified portion of the male inflorescence.
4. A male flower, shewing 10 stamens—they vary from 5 to 12.
5. An anther, front view.
6. A portion of an ament of young fruit.
7. A young fruit or capsule.
8. The same burst into 2 valves, shewing the cottony mass which envelopes the seed.
9. Transverse section of the same, the 4 seeds immersed in wool.
10. Vertical section of the same.

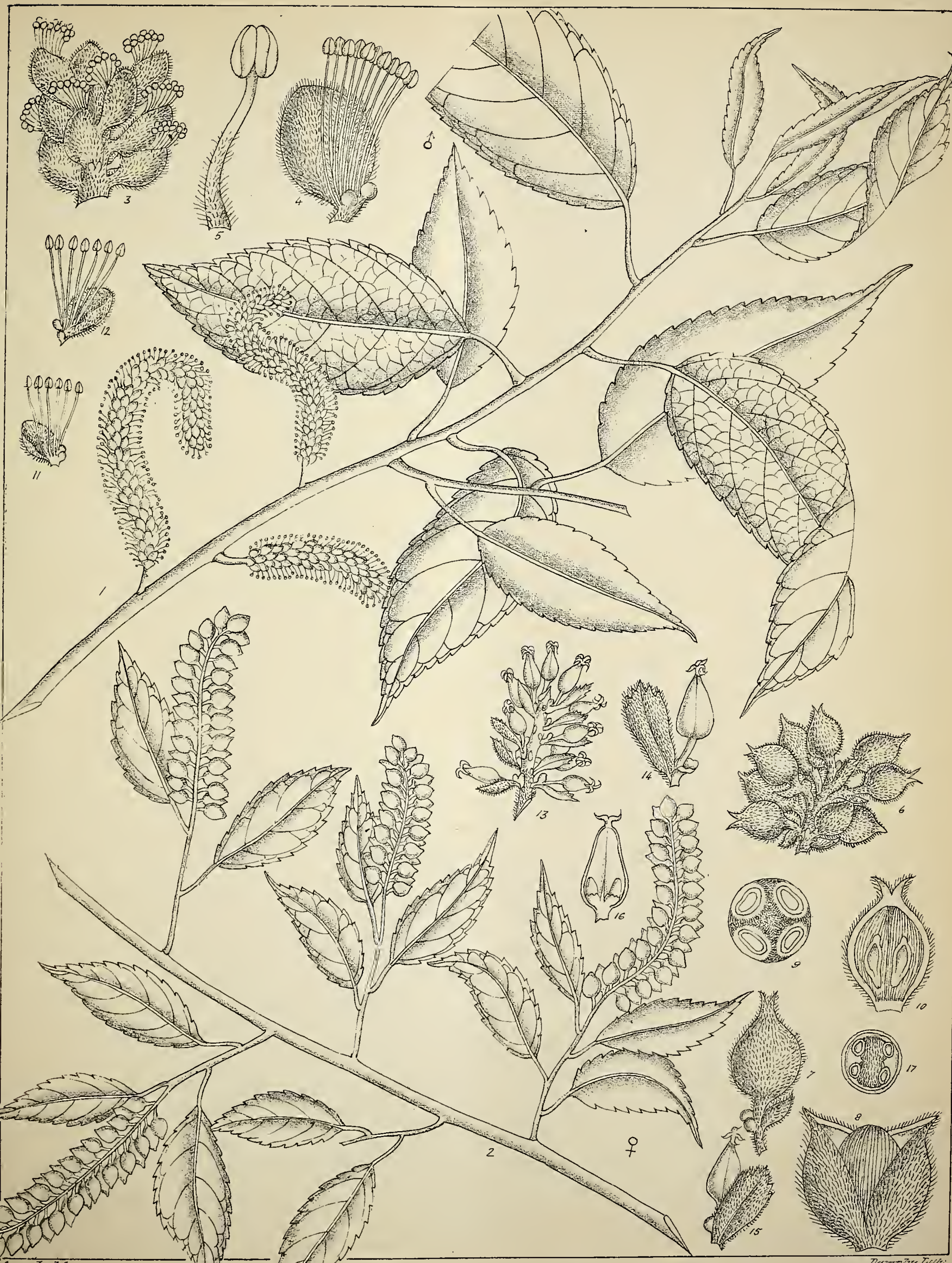
11 & 12. Male flowers, shewing 6 and 7 stamens.

13. Magnified portion of a female ament.

14 & 15. Female flowers.

16. Vertical section of the ovary.
17. Transverse section of the ovary.

(Nos. 1 to 10 drawn from dried specimens, the male from 4000 feet elevation, the female from sea level; Nos. 11 to 17 drawn from living specimens collected at 7000 feet on the Nilgiris.)



Covindo del. Dunphy Lith.

Salix tetrasperma (Roxb.)

GYRINOPS WALLA. (Nat. order Thymelaceæ.)

GYRINOPS, *Gærtn.*—GEN. CHAR. Perianth colored tubular slender, the limb 5-parted, scales 5, gland-like hid in a dense ring of hairs in the jaws of the tube, anthers 5 sessile in the jaws of the tube, included, opposite the segments of the perianth affixed by their back, hypogynous scales none. Ovary on a long stipe attenuated at both ends pubescent 2-celled, cells 1-ovuled, style terminal cylindric deciduous, stigma flattened globose undivided. Capsule stipitate coriaceous loculicidally 2-valved, seed solitary. *Gærtn. Fr.* 2.

GYRINOPS WALLA. (Gærtn.) A small tree or large shrub, young parts sericeous, branches slender of an orange yellow color, as is the whole plant; leaves oblongo-elliptic more or less acuminate subcoriaceous very glabrous in age, densely transverse-venose, (as in Calophyllum) 2-4 inches long by $\frac{3}{4}$-$1\frac{3}{4}$ inches broad, petioles channelled about 3 lines long, inflorescence sericeous, peduncles axillary or from the old axils or from the stem between the leaves, 2 lines long 3-8 flowered, pedicels 2-3 lines long, bracteoles linear lanceolate chaffy about 3 lines long, sericeous on the outside glabrous within very early caducous, perianth orange colored 4-6 lines long attenuated at the base, lobes about 1 line long ovate patent. Capsule spathulato-obovate compressed shortly apiculate 6-8 lines long. *DC. Prod.* xiv. 602 ;—*Wight Icones tab.* 1850.

A very elegant little tree common about Badagam near Galle, and the warmer parts of the south of Ceylon, called Walla by the Singalese ; the bark yields a very strong fibre.

Analysis.

1. A flower bud.
2. A flower.
3. A flower cut open, shewing the insertion of the sessile stamens and the dense ring of hairs just within the apex of the tube ; 5 yellow glands are hid within this hair.

3*a*. One of the glands removed from the ring of hairs.

4. An anther.
5. Stipitate ovary, style and stigma.
6. Ovary cut vertically.
7. Ovary cut transversely.
8. Fruit. (Drawn from flowers in spirits.)

PL: CCCIII.

Govindo, del:

Dunphy, Lith:

Gyrinops Walla, (Gaertn.)

PYRULARIA WALLICHIANA. (Nat. order Santalaceæ.)

PYRULARIA, *Mich.*—GEN. CHAR. Flowers hermathrodite and male, the male subglobose, the hermathrodite turbinate, perianth 5-4-fid, lobes imbricate (or valvate ?) each furnished on the inside near the base with a hairy scale, stamens in both hermathrodite and male as many as the perianth lobes opposite to them and inserted at their base just under the margin of the disk, filaments short entire or bifid at the apex, anthers ellipsoid 2-celled, cells distinct dehiscing longitudinally, disk cupuliform the margin 5-lobed, the lobes thick entire or emarginate alternate with the segments of the perianth, ovary in the male flowers obsolete, style thick 4-grooved, stigma 4-(3-) lobed, ovary in the hermathrodite flowers inferior, placenta erect tapering at length twisted, ovules 2-4 diverging and pendant from the apex of the placenta, drupe inferior pyriform crowned at the depressed umbilicate apex with the lobes of the perianth, putamen 1-seeded. Trees or shrubs, often armed, leaves alternate entire, flowers in axillary spikes. *Mich. Fl. Bor. Arn.* 2 *p.* 234. Hamiltonia, *Muhlenb.* not *Roxb.* Sphærocarya, *Wall. in Roxb. Fl. Ind.* ii. 371. Scleropyrum, *Arn. in Mag. of Zool. and Bot.* ii. 550.

PYRULARIA WALLICHIANA. (Wight.) A middling sized or small tree, trunk very thorny, young parts reddish, branchlets terete armed glabrous, leaves coriaceous glabrous ovate or ovato-lanceolate acute or obtuse shining above paler beneath, 3-6 inches long by 1½-3 inches broad, penniveined, the veins distant 3-4 on each side, petioles 2-4 lines long, spikes axillary or from the old axils solitary or several together, the male very densely flowered 1-1½ inches long, the flowers reddish globose, each with a minute hairy bract, perianth hairy on the outside 5-(4-) lobed (5 in all the flowers I have examined), lobes distinctly imbricate, filaments flat bifid at the apex, ovary obsolete, style thick angular, stigma 4-lobed, lobes erect acute 2 larger than the others, *the hermathrodite* laxly flowered 2-4 inches long, the flowers turbinate 4-5 lines long, hairy on the outside, each with a small bract at the base, stamens smaller than in the male but bearing pollen, stigma 4-lobed larger than in the male flower, lobes spreading, fruit about 1¼ inches long.—Sphærocarya Wallichiana, *Wight* ;—*WA. in Edin. Journ.* 15. *p.* 180. Scleropyrum Wallichiana, *Arnt.* ;—*Wight Icones tab.* 241. Idu-mulli, *Rheed. Mal.* 4 *t.* 18. Pyrularia Wallichiana et Ceylanica, *D C. Prod.* xiv. 629.

This tree is most abundant in Coorg and in parts of Wynaad, 3-5000 *feet elevation, but I have not observed it elsewhere in this presidency ; it is also found in Ceylon (*4-6000 *feet). The wood is light colored and curiously grained, and is in use in Ceylon for ordinary purposes.*

Analysis.

The figure represents a branch with male inflorescence only.

1. Male spike.
2 & 3. Male flowers, shewing the imbricate lobes of the perianth.
3*a*. The 4-lobed style of the male flower.
4. Anthers, front view.
5. Anthers, back view.
6. Portion of the perianth and disk, shewing the hairy scales on the inside of the segments of the former and the insertion of the stamens.
7. Hermathrodite inflorescence.
8. Hermathrodite flower (lobes imbricate) and bract.
9. Hermathrodite flower and ovary cut vertically.
10. Fruit.

(The male drawn from living specimens, the hermathrodite from flowers in spirits.)

Gowinda del.

Dunphy Lith.

Pyrularia Wallichiana, Wight.

ALLÆANTHUS ZEYLANICUS. (Nat. order Urticeæ.)

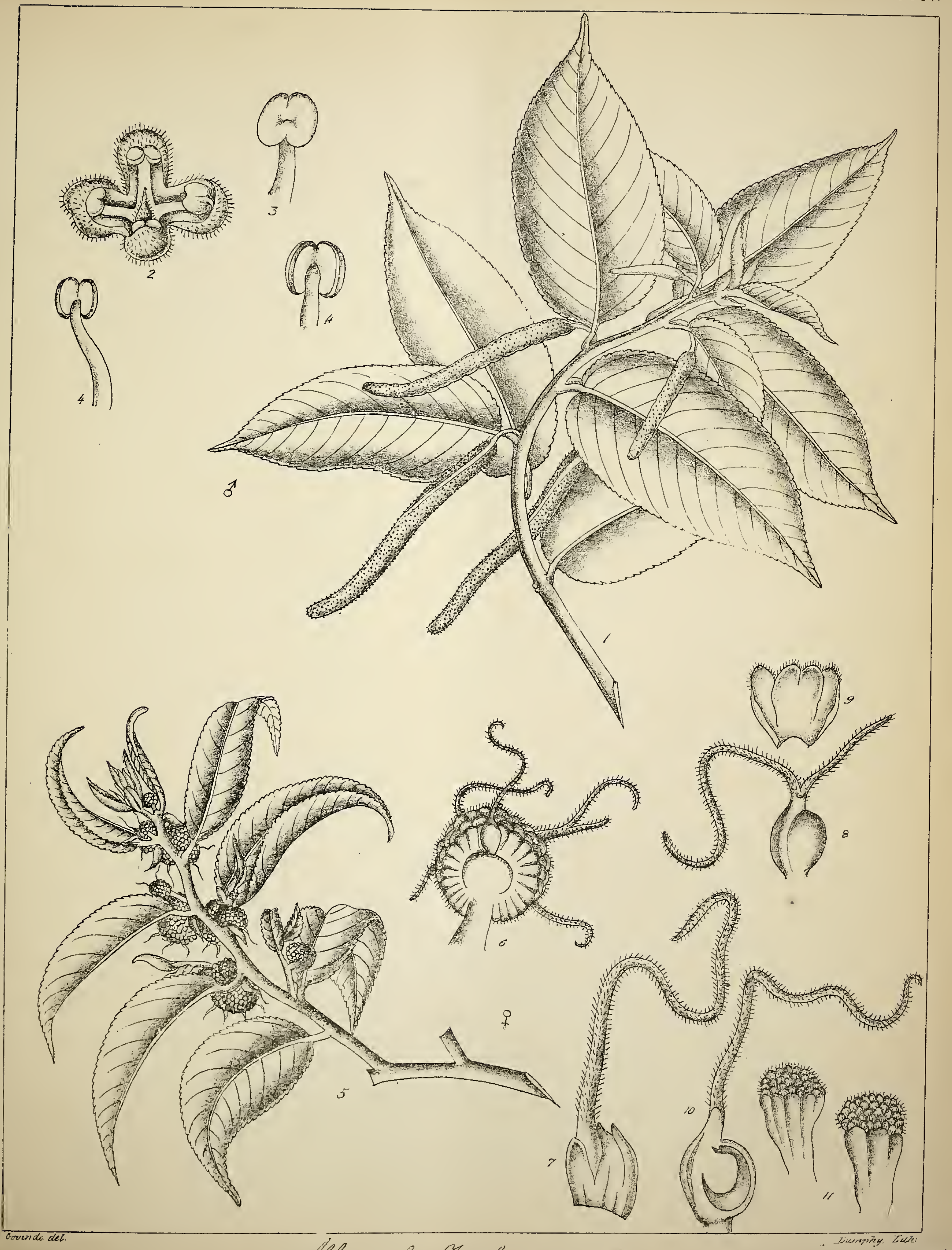
ALLÆANTHUS, *Thw.*—GEN. CHAR. Flowers diæcious. *Male*, in axillary unilateral dense aggregated peduncled spikes, perianth 4-parted, segments imbricate in the bud, stamens as many as the segments and opposite to thom inflexed in bud, rudiment of ovary small conical subulate. *Female*, few in globose axillary congested heads mixed with many abortive squamæform ones, perianth tubular irregularly 4-cleft, segments imbricate, ovary free sessile 1-celled, ovule solitary pendulous campylotropal, style subterminal short, stigma elongate simple or rarely with a shorter 2nd branch. *Thw. En. Pl. Zey. p.* 263, *and Hook. Journ. of Bot.* vi. 302.

ALLÆANTHUS ZEYLANICUS. (Thw.) A large tree 30-40 feet high, branches terete pilose milky, leaves alternate distichous cordato-lanceolate acuminate serrate penniveined pilose, paler beneath venose, 3-4 inches long by $1\frac{1}{4}$-$1\frac{3}{4}$ inches broad, petioles pilose 3 lines long, stipules oblong acuminate membranaceous nearly smooth striated oblique deciduous 2 lines long $1\frac{1}{2}$ lines broad. *Male*, spikes 1-$2\frac{1}{4}$ inches long 2 lines broad, pilose, peduncle 2-3 lines long. *Female*, heads 4 lines in diameter shortly peduncled pilose. *Thw. l. c.*

This tree has only been detected in Ceylon (central provinces, up to 2000 *feet elevation) where it is called Allandoo; the timber is in use for ordinary purposes; a very tough fibre is obtained from the inner bark, which is used for a variety of purposes.*

Analysis.

1. A branch of the male in flower.
2. A male flower.
3. Anther, front view.
4. Anther, back view.
5. A branch of the female in flower.
6. A head of female flowers cut through vertically.
7. A female flower with the short style and long simple stigma. One of the branches of the latter short.
9. The tubular 4-cleft perianth.
10. Ovary cut vertically, shewing the solitary pendulous ovule.
11. The abortivo scale-like ovaries from the female capitula. (From a drawing communicated by Dr. Thwaites.)



Govinda del. Dunphy Lith.

Alloeanthus Zeylanicus (Thw.

LAPORTEA CRENULATA. (Nat. order Urticeæ.)

LAPORTEA, *Gaudich* —GEN. CHAR. Flowers monœcious or diœcious. *Male*, perianth 4-5 parted, stamens as many opposite the perianth segments, filaments incurved in the bud, rudiments of ovary subglobose. *Female*, perianth 4 parted, segments equal or unequal, stigma long subulate tapering villous; ovary free 1-celled, ovule solitary erect, achenium obliquely ovate or subglobose, seed erect, albumen fleshy, cotyledons ovate, radicle cylindric superior. Trees, shrubs or herbs, leaves alternate, flowers in axillary panicles.

LAPORTEA CRENULATA. (Roxb.) A small tree or large shrub, diœcious unarmed, leaves ovate-elliptic to oblongo-elliptic with a longish acumination, crenulate or serrate towards the apex or quite entire, 5-12 inches long by 2-4 broad, penniveined, perfectly glabrous on both sides or with a very few long white stinging hairs on the costa beneath and sometimes above, petioles 2-4 inches long more or less furnished with long stinging white hairs, panicles cymose lax shorter than the leaves copiously furnished with the same hairs, flowers small greenish, perianth lobes equal or subequal.—Urtica crenulata, *Roxb. Fl. Ind.* iii. 591. Laportea crenulata et gigantea, *Gaudich.* Urera Javanensis, *Gaudich. Voy. Freyc. p.* 496. Dendrocnide crenulata, *Miq. Pl. Jungh.* 1 *p.* 31.

This dreadfully stinging tree or large shrub is only too common in most of our western coast moist forests up to 5000 *feet, and it also inhabits Ceylon, Bengal and Java; it is introduced here chiefly to caution Forest Officers against it with reference to its stinging properties. I quote the following from Lindley's Vegetable Kingdom. "Leschenault de la Tour thus describes the effect of gathering Urtica crenulata in the Botanic Garden at Calcutta:"—*

"One of the leaves slightly touched the first three fingers of my left hand; at the time I only perceived a slight pricking, to which I paid no attention. This was at seven in the morning. The pain continued to increase; in an hour it had become intolerable; it seemed as if some one was rubbing my fingers with a hot iron. Nevertheless, there was no remarkable appearance; neither swelling, nor pustule, nor inflammation. The pain rapidly spread along the arm, as far as the armpit. I was then seized with frequent sneezing, and with a copious running at the nose, as if I had caught a violent cold in the head. About noon I experienced a painful contraction of the back of the jaws, which made me fear an attack of tetanus. I then went to bed, hoping that repose would alleviate my suffering, but it did not abate; on the contrary, it continued nearly the whole of the following night, but I lost the contraction of the jaws about seven in the evening. The next morning the pain began to leave me, and I fell asleep. I continued to suffer for two days; and the pain returned in full force when I put my hand into water. I did not finally lose it for nine days." "A similar circumstance occurred, with precisely the same symptoms, to a workman in the Calcutta Garden. This man described the sensation, when water was applied to the stung part, to be as if boiling oil was poured over him." In cutting boundary lines, exploring forests, botanizing, &c., I have been very often stung by this plant both on the hands and face, but never found the effects so violent as described by Leschenault; they are however bad enough, the pain being felt more or less for several days and always being intensified by the application of water. With natives the sting often brings on fever, and the plant is known to Coffee planters as the Fever Nettle and the Devil Nettle. In Ceylon it is called Maoosa.

Analysis.

The figure represents a branch of the male tree in flower.

1. A male flower bud.
2 & 3. Views of the male flower.
4. A male flower opened to shew insertion of the stamens and the abortive ovary.
5. Anther, front view.
6. Anther, back view.
7. Female inflorescence.
8. Portion of the same highly magnified.
9. A female flower.
10. Calyx and ovary.
11. Ovary cut vertically, shewing the solitary erect ovule.
12. Ovary cut transversely.
13 Branch in fruit. (All drawn from living specimens).

Govindoo, del: Dunphy Lith:

Laportea crenulata. (Roxb.)

ANTIARIS INNOXIA. (Nat. order Urticeæ.)

ANTIARIS, *Leschen.*—GEN. CHAR. Flowers monœcious. *Male* involucre many-flowered many-leaved, leaflets imbricate connate at the base surrounding an orbicular flat or convex receptacle, florets sessile dense-packed, perianth of 3-4 spathulate leaflets connivent towards the apex, stamens 3-8 on a flat receptacle, filaments obsolete or very short, anthers extrorse 2-celled. *Female* involucre 1-flowered, urceolate many cleft at the apex, perianth none, ovary connate with the involucre 1-celled, ovule 1 pendulous from the apex of the cell anatropal. Style terminal bifid the divisions filiform stigmatose, drupe formed of the baccate involucre, seed pendulous, Embryo exalbuminous orthotropal, cotyledons large fleshy ovate plano-convex smooth, radicle very short superior. Trees, leaves simple alternate stipulate, peduncles axillary.

ANTIARIS INNOXIA. (Blume.) A gigantic tree up to 250 feet in height and of enormous girth, leaves oblong-elliptic dentate serrulate or entire, scabrous, about 6 inches long by 2-2¼ inch broad, petioles 3 lines long. Male flowers with 3-8 stamens, the perianth leaves generally 4 obovate spathulate cucullate hairy on the outside, fruit size of a nut, purple. *Bl. Rump.* 1. 172 *t.* 54. A. saccidora, *Dalz. in Hook. Journ. Bot.* iii. 231 ;—*Wight Icones tab.* 1958. A. toxicaria, *Hook. Comp. to Bot. Mag.* i. 311 *t.* 17. Lepurandra saccidora, *Nimmo Pl. of Bombay* 193.

This is the largest tree in our forests; it is common along all the Western Ghats from Bombay down to Cape Comorin, and is also found in Ceylon; in the Anamallays it is called Alli, in Bombay Juzoogri, and in Ceylon Ritti. It flowers in the rains and ripens its fruit in January. The wood is soft and of no value, the nuts are intensely bitter and contain an azotized principle, which may prove an active medical agent. On wounding the fruit a milky viscid fluid exudes which hardens into a wax-like substance and becomes black and shining; the inner bark of the tree is composed of very strong tenacious fibres and is adapted for cordage or matting. In Coorg and Wynaad the hill men manufacture sacks from this tree: a branch or trunk is cut corresponding to the length and breadth of the sack required, it is soaked a little, and then beaten with clubs until the fibre separates from the wood; this done the sack formed of the bark is turned inside out and the wood sawn off, leaving a small piece at the bottom of the sack; these sacks are in general use for carrying rice, &c. The male flowers have been described as having 4 stamens each opposite a leaflet of the perianth; my analysis differs considerably, the stamens being always 5-8. The drawings were, however, made from living flowers collected on the Nilgiris.

Analysis.

The figure represents a branch of the tree, shewing the solitary female flowers and the male flowers collected in dense heads.

1. Female flower.
2. Female flower cut vertically, shewing the solitary pendulous ovule.
3. Young fruit.
4. The same cut transversely.

5 & 6. Seed and embryo.

7 & 8. Male inflorescence collected in dense heads.

9. A male flower, 5 stamens on a flat receptacle.
10. Male flower shewing 6 stamens.
11. Male flower with 8 stamens.

12 & 13. Front and back view of the obovate spathulate petals.

14. Anther, front view.
15. Anther, back view. The drawings of the branch in flower and the female dissections (1 to 6) communicated by Dr. Thwaites (from Ceylon specimens); the male dissections (7 to 15) from living specimens collected on the western slopes of the Nilgiris.

Covardo. del:

Dumphy Lith:

Antiaris innoxia (Bl.)

ARTOCARPUS HIRSUTA. (Nat. order Urticeæ.)

ARTOCARPUS, *Linn.*—GEN. CHAR. Flowers monœcious, minute, densely packed on the outside of a globose or oblong succulent receptacle, the males and females in separate heads. Male flowers: Perianth of 2 to 4 segments, imbricate in the bud. Stamen 1. Female flowers: Perianth tubular entire. Style usually simple and linear, protruding from the perianth. Ovary usually 1-celled, with 1 pendulous ovule. Fruit compound, consisting of the somewhat enlarged persistent and consolidated perianths, each enclosing a minute nut. Seeds without albumen. Trees or shrubs, with milky juice. Leaves alternate, entire or divided. Flower-heads axillary or terminal solitary or 2 together.

ARTOCARPUS HIRSUTA, (Lam.) A very lofty tree attaining upwards of 200 feet in height and of great girth, young parts hirsute, leaves ovate to oval (those of saplings or occasionally a few on older trees deeply pinnatifid and serrate) entire acute or obtuse, glabrous above in age, hairy underneath particularly on the prominent parallel veins, 6-12 inches long by 4-6 inches broad, (those of saplings often much larger), petioles 6-12 lines long hirsute, stipules lanceolate hirsute; male aments slender 3-4 inches long and 3 lines in diameter axillary solitary or in pairs, at first erect at length pendulous on peduncles $\frac{1}{2}$-1 inch long, the florets mixed with numerous linear chaffy bracts; female aments solitary oval or roundish about 1 inch long by 6-8 lines broad on peduncles about 3 inches long, the upper part of the florets nearly solid tapering, armed with stiff bristles and almost consolidated with the style which is much exserted, fruit oval about the size of a lemon armed with numerous hispid spines, seeds numerous oval or ovate the size of a bean. *Roxb. Fl. Ind.* iii. 521.

This very valuable timber tree is most abundant in the moist forests of the Western Ghats of the Bombay and Madras presidencies from the sea level up to about 4000 *feet elevation; it is well known by the Tamil and Malayalum names of Ayni and Angelli, and in Canarese (Mysore) it is called Hebalsu; its timber is strong and tolerably close and even grained, of a glossy texture and yellowish brown color, weighs about* 48 *lbs. when unseasoned and* 40 *lbs. per cubic foot when seasoned, and has a specific gravity of* ·604; *it is much in use for ship building, house building, furniture, and various other purposes.*

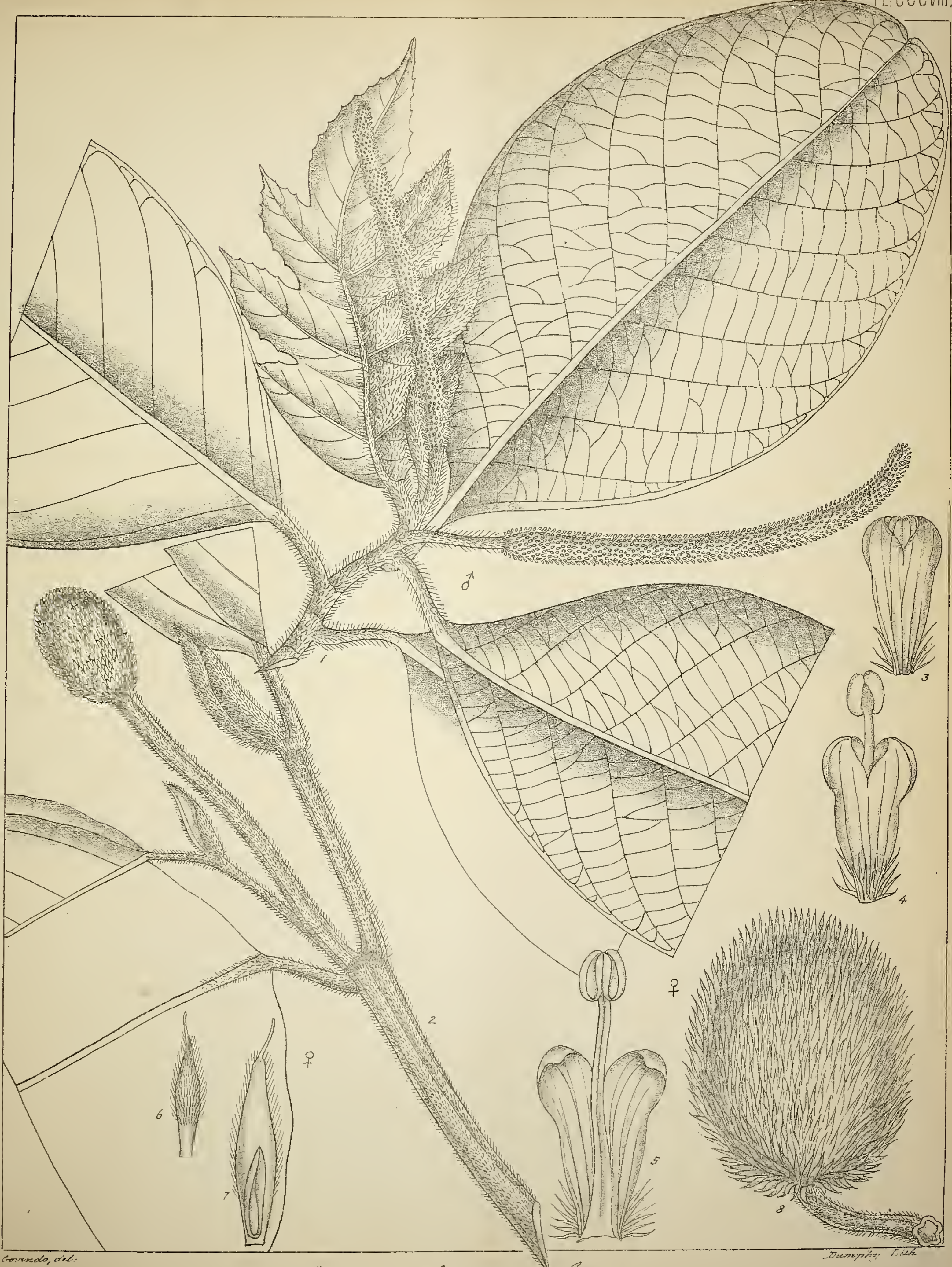
Analysis.

1. Portion of a branch with male inflorescence, and shewing one of the pinnatifid leaves which very rarely occur on a flowering branch though abundant on saplings.
2. Portion of a branch with female inflorescence.

3, 4, 5. Male florets.

6. A female floret.
7. Female floret, vertical section, shewing the ovary and the solitary pendulous ovule.
8. A young fruit. (All drawn from living specimens.)

PL. CCCVIII.



Govindo, del. Dunphy lith.

Artocarpus hirsuta. (Lam.)

ARTOCARPUS NOBILIS. (Nat. order Urticeæ.)

For Gen. Char. see letter-press to Pl. cccviii.

ARTOCARPUS NOBILIS. (Thw.) A large tree 50 feet high and up to 12 feet in girth, monœcious, young branchlets terete strigoso-scabrous, rugulose, leaves asperulous ovate shortly acuminate, the margin coarsely crenated, above dark-green with the costa and veins pale, beneath pale green, up to 14 inches long by about 10 inches broad, those of saplings often larger and pinnatifid, petiole cylindric $\frac{3}{4}$-1$\frac{1}{2}$ inches long furnished sparingly with long hairs, stipules strigose 2-3 inches long soon deciduous, peduncles axillary 2-3$\frac{1}{2}$ inches long, the aments covered with orbicular stipitate peltate puberulous persistent scales, the *male* linear-cylindric 3-6 inches long by 5-8 lines in diameter, the *female* oblongo-cylindric shorter and broader than the male, flowers minute very numerous papillæform a little glandular, fruit oblong papillose 6-8 inches long 3$\frac{1}{2}$-4 inches broad, seed subspherical white $\frac{1}{2}$ an inch in diameter. *Thw. En. Pl. Zey. p.* 262.

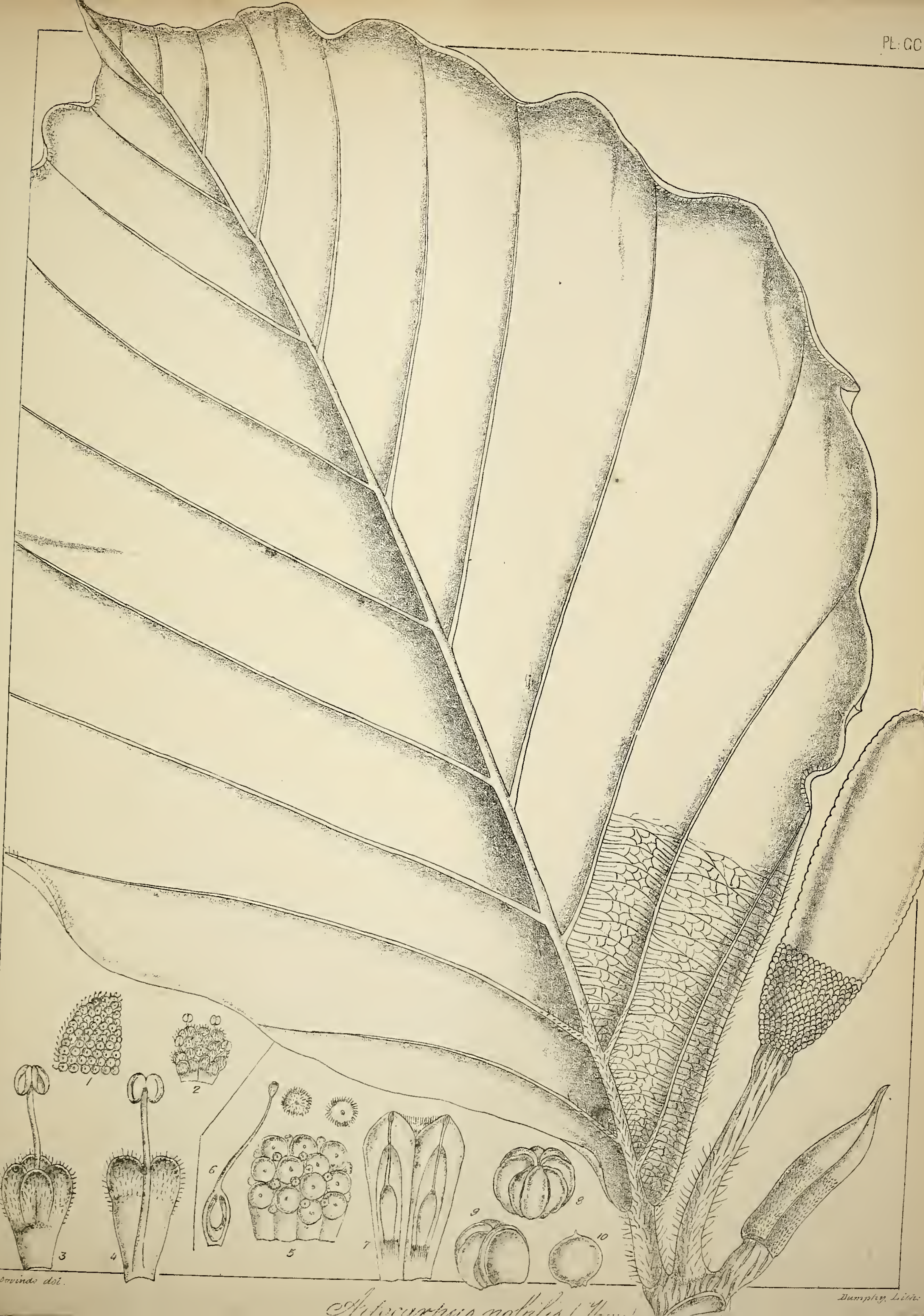
This magnificent tree is only found in Ceylon, where it is most abundant in the southern and central parts of the island up to 2000 *feet elevation, and well known by the Singalese name Del; the timber is of good quality and much in use for various purposes, such as common furniture, almirahs, &c., and boats are hollowed out of single trees.*

Analysis.

The figure represents a leaf and female ament.

1 & 2. Portions of male ament.
3. A male flower shewing the solitary stamen and front view of anther.
4. Male flower cut open, shewing insertion of the stamens and back view of the anther.
5. Portion of a female ament.
6. Ovary cut vertically, shewing the single pendulous ovule.
7. Section of a portion of a female ament shewing the flowers.
8. Nearly ripe seed enclosed in the enlarged perianth (removed from the fruit.)
9. The same cut open.
10. Nearly ripe seed. (All drawn from flowers in spirits.)

PL: CCCIX.



Govinda del. Dunphy, Lith.

Artocarpus nobilis (Thw.)

ULMUS INTEGRIFOLIA. (Nat. order Urticeæ.)

ULMUS, *Linn.*—GEN. CHAR. Flowers hermathrodite, or male and female, perianth membranaceous 4-8 parted, stamens 4 9, ovary ovoid sometimes pedicelled 1-2 celied, ovules solitary in the cells pendulous anatropal, styles 2 divaricato-patent stigmatose on the inner face, fruit a compressed samara winged all round 1-seeded, seed inverse, embryo exalbuminous orthotropal; radicle superior. Trees or shrubs, leaves alternate.—Holoptelæa, *Planch.*

ULMUS INTEGRIFOLIA. (Roxb.) A good sized tree, leaves ovate or ovato-cordate acute or obtuse entire glabrous shining 3-5 inches long by 1½-2 broad, stipules lanceolate caducous, flowers fascicled; male, female and hermathrodite mixed in the same fascicles, perianth deeply 4-8 parted slightly hairy, segments oval caducous, stamens 5-9 scarcely longer than the perianth, ovary pedicelled oval compressed, styles 2 as long as the ovary, fruit flat winged all round emarginate at the apex. *Roxb. Pl. Corom.* i. *t.* 78. Holoptelæa integrifolia, *Planch. Ann. des Scien. Nat. Ser.* iii. *vol.* x. *p.* 266.

A timber tree common in many parts of this presidency and in Ceylon; it is a deciduous tree and generally flowers before the young leaves appear, and consequently when quite destitute of foliage, but it is sometimes found in flower when in full foliage as in the drawing. The wood is strong and reddish in color, and much in use for building and for carts and a variety of purposes; the tree is known by the Teligu names of Nowlee and Pedda nowlee eragu; in Tamil it is called Ayàh, in Canarese Rào bija, in Marattah (Bombay presidency) Wawalee, and in Ceylon Dada hirilla.

Analysis.

1. Flower bud.
2. A male flower, 8 stamens, no ovary.
3. Hermathrodite flower, 5 stamens, stipitate ovary and stigmas.
4. Anthers, front and black view.
5. Ovary and stigmas.
6. Stigma, much magnified.
7. Ovary cut vertically, 1 pendulous ovule.
8. The suborbicular leafy fruit or capsule. (Drawn from living specimens.)

Govindo del. Dunphy lith.

Ulmus integrifolia (Roxb.)

SPONIA WIGHTII. (Nat. order Urticeæ.)

SPONIA, *Lam.*—GEN. CHAR. Flowers polygamous, male, female and hermathrodite, or diæcious in axillary cymes, perianth persistent of 5 segments imbricate or nearly valvate in the bud. Stamens exserted opposite to and as many as the segments of the perianth, surrounding an abortive ovary, anthers introrse, 2-celled, ovary globose sessile 1-celled, stigmas 2 short and plumose, drupe ovoid or globose, cotyledons folded. Trees, leaves alternate, flowers small usually numerous.

SPONIA WIGHTII. (Planch.) A small or middling sized tree not of long duration, leaves obliquely cordate serrate finely acuminate, above a little scabrous, beneath villous and whitish, flowers axillary on short 2-cleft diverging peduncles, the male and female generally on separate trees, but sometimes mixed, in the male a small obovate abortive ovary, in the females stigmas about as long as the ovary, drupe small succulent, when ripe black, nut rugose 1-celled, 1 seeded. *Planchon Ann. des Scien. Nat. Ser.* iii. *vol.* x. ;—*Wight Icones tab.* 1971.

This tree is common throughout the presidency, and it is occasionally planted by coffee planters for shade because of its rapid growth, and is known to them as the Charcoal-tree ; it ascends the mountains to above 5000 *feet elevation. The wood is soft and white, but makes about the best charcoal for gunpowder ; it is called in Tamil Mini, and in Teligu Gadda nelli. It is very curious how this tree springs up in all places where heavy moist forest is cleared away for coffee or other purposes, although there may not be a plant of it within miles.*

Analysis.

1. Branch of male tree in flower.
2. Branch of female tree in flower.
3. The male inflorescence magnified.
4. A bract.
5. A flower bud.
6. A flower.
7. The same open, shewing 5 stamens inserted round an abortive ovary.
8. Anther, front view.
9. Anther, back view.
10. Female inflorescence magnified.
11. A female flower, calyx, ovary and stigmas.
12. The imbricate calyx or perianth opened.
13. Stigma much magnified.
14. Ovary cut vertically, 1-celled, 1 pendulous ovule.
15. Ovary cut transversely. (All drawn from fresh specimens collected on the Nilgiris, 4000 feet elevation.)

Govindo del. Dunphy Lith.

Sponia Wightii (Planch.)

CELTIS TRINERVIA. (Nat. order Urticeæ.)

CELTIS, *Tournef.*—GEN. CHAR. Flowers polygamous hermathrodite and male in axillary or lateral cymes, perianth of 4-5 rarely 6 segments imbricate in the bud deciduous, stamens as many and opposite the segments incurved shorter than the perianth, anthers introrse 2-celled, ovary inserted on a hairy disk 1-celled, ovule solitary pendulous from near the apex, micropyle superior, stigmas 2 linear or oblong recurved not plumose, drupe fleshy smooth ovoid or globose, seed pendulous, cotyledons folded, albumen subgelatinous, radicle thick superior. Trees or shrubs, leaves alternate generally 3-nerved serrate or entire. *Linn. Gen. n.* 1143. Sponioceltis, *Planchon.* Solenostigma, *Planchon.*

CELTIS TRINERVIA. (Roxb.) A good sized tree, young parts aureo-pubescent, leaves alternate obliquely-ovate sub-cordate at the base, with a longish acumen at the apex, in age quite glabrous on both sides, coarsely serrate in the upper half, $3\frac{1}{2}$-6 inches long by $2\text{-}3\frac{1}{4}$ inches broad, prominently 3 nerved, the nerves channelled on the upper side raised and very prominent beneath, the transverse veinlets somewhat arched prominent beneath, petioles 2-4 lines long, stipules ensiform, inflorescence racemose pubescent generally on the young shoots axillary or below the leaves, perianth 4-5-merous, stigmas large spreading villous. *Roxb. Fl. Ind.* iii. 65. Celtis Roxburghii, *Planchon. Ann. Scien. Nat. Ser.* iii. *t.* x. *p.* 302.

I have only met with this tree on the Eastern Ghats of the Madras presidency, Golcondah Hills, near Vizagapatam, 3000 *feet elevation; but it probably also occurs on the western coast, as Mr. Dalzell found it on the Bombay ghats. Dr. Roxburgh found it in Eastern Bengal. I am not acquainted with its timber.*

Analysis.

1. A flower bud.
2. A 4-merous male flower.
3. A 5-merous male flower.
4. Anther, front view.
5. Anther, back view. (Drawn from dried specimens. I have no fertile flowers of this species.)

2. CELTIS SEROTINA.

1. A male flower bud.
2. A male flower.
3. The same opened.
4. The abortive ovary.
5. Anther, front view.
6. Anther, back view.
7. Hermathrodite inflorescence.
8. Fruit.
9. Hermathrodite flowers.
10, 11. Anthers, front and back view.
12. Ovary cut vertically, shewing the solitary pendulous ovule.
13. Embryo. (All drawn from living specimens except 8 and 13, copied from Wight's *Icones.*)

PL: CCCXII.

Cor. ndo del.

Dempsky. Lith.

Celtis trinervia (Koch.)

GIRONNIERA RETICULATA. (Nat. order Urticeæ.)

GIRONNIERA, *Gaud.*—GEN. CHAR. Flowers small diæcious male and female, no hermathrodite, in axillary cymes or branched racemes, perianth of 4-5 segments imbricate in the bud. *Male*, stamens 4-5 opposite the perianth-segments with or without an abortive ovary, filaments slightly incurved. *Female*, no stamens present, ovary with 1 pendulous ovule, style 1, stigmas 2 long and filiform, drupe slightly compressed. Trees or shrubs, eaves alternate, stipules large free convolute covering the terminal buds (as in Ficus) deciduous —Helminthospermum, *Thw.* Nematostigma, *Planchon.*

GIRONNIERA RETICULATA. (Thw.) A large timber tree, young parts sparingly adpresso-pilose but soon glabrous, leaves very hard coriaceous ovate to oblongo-ovate generally with a long acumination, glabrous in age on both sides and shining above, 3-5½ inches long by 1½-2¾ broad, penniveined and prominently reticulated, the 9-14 primary veins on each side much raised and prominent beneath, petioles 2-4 lines long, stipules long linear-lanceolate as in the generic character. *Male* flowers in panicles axillary or between the leaves, perianth segments 5 rounded obtuse puberulous or subglabrous, abortive ovary generally wanting. *Female* flowers solitary axillary pedicellate, drupe glabrous ovoid a little compressed attenuated at the apex, 6 lines long by 4 lines broad, crowned with the remains of the stigmas. *Thw. En. Pl. Zey. p.* 268.

This valuable timber tree is found on our Ghat forests up to 3000 *feet elevation, from South Canara down to Travancore and Tinnevelly, and it also inhabits Ceylon ; the wood is very hard and heavy, and is a valuable engineering timber. In Tinnevelly the tree is called Koditàni. The specimen figured was collected on the Carcoor ghat (Wynad), and as I could not find the female tree I have added dissections of both female and male from another species, the G. subæqualis.*

Analysis.

The plate gives a branch of the male tree in flower.

1. Portion of male inflorescence.
2. A male flower bud.
3. Male flower.
4. A male flower open.
5. Anthers, front and back view. (Drawn from living specimens.)

GIRONNIERA SUBÆQUALIS.

6. Branch of male tree.
7. Male flower bud.
8. Male flower open.
9. Anther, front view.
10. Anther, back view.
11. Abortive style.
12. Branch of female tree.

13 & 13*a*. Female flowers.
14 & 15. Female flowers cut vertically, shewing the solitary pendulous ovule.
16 & 17. Seed.
18. Ovule. (16, 17 & 18 copied from Blume's drawings, the rest from dried specimens.)

Govindo, del. Dunphy Lith.

FICUS RELIGIOSA. (Nat. order Urticeæ.)

FICUS, *Linn.*—GEN. CHAR. Flowers unisexual, minute, enclosed in a hollow globular ovoid or pear-shaped succulent receptacle called a *fig or synœcium ;* the minute aperture closed by bracts turned inwards. *Male* flowers usually near the mouth of the fig. Perianth 3 to 6 lobed. Stamens usually 1 or 2, rarely more. *Female* flowers usually lining the greater part of the cavity. Perianth entire, or of 2 or more lobes or segments. Ovary 1-celled, with 1 pendulous or laterally attached ovule. Style usually lateral, with a more or less oblique variously shaped stigma. Fruiting fig usually enlarged, the enclosed seed-like nuts surrounded each by its membranous or pulpy persistent perianth. Embryo curved, in a fleshy albumen. Trees or shrubs, with the juice usually milky. Leaves alternate, or very rarely opposite, entire or divided. Figs (receptacles) solitary, or in clusters of 2 or more, axillary, or on the old wood below the leaves, usually with 3 small bracts at their base, or at the base of the pedicel. *Benth. Fl. Hong Kong p.* 326. Urostigma, *Gasparrini.*

FICUS RELIGIOSA. (Linn.) A very large tree, root spreading horizontally and near the surface, trunk up to 25 feet in girth, bark pretty smooth ash-colored, branches numerous spreading, leaves (deciduous in the cold season) alternate cordate with a very long cuspidate point $1\frac{1}{2}$-2 inches long, the margins scollop-waved, glabrous on both sides and shining above, 6-7 inches long, 3-$3\frac{1}{2}$ inches broad, the primary veins very prominent, the veinlets beautifully reticulated, petioles round smooth slender 3-$4\frac{1}{2}$ inches long, stipules sheathing soon caducous, figs in axillary pairs sessile or shortly pedicellate vertically compressed, smooth, blackish when ripe with 3 bracts at their base.—Urostigma religiosa, *Gasp.* ;—*Wight Ic. t.* 1967.

This very beautiful tree is held very sacred by the natives in India and Ceylon ; it is common in our forests and cultivated throughout India, particularly as an avenue tree and as a sacred tree ; it is every where known by its Hindoostani name Peepul, and is called 'Arasi in Tamil, Râi in Telugu, and Bo in Ceylon. The wood, like that of the Banian (F. Indica) and most other species, is white, light and very perishable, rather coarse grained and brittle and not durable, and only fit for fuel, and bad even for that. Silk worms are very fond of its leaves. A cubic foot unseasoned weighs 40-42 *lbs., and* 34 *lbs. when seasoned, and its specific gravity is* ·544.

Analysis.

1, 2. A male floret removed from the inside of the receptacle or fig.
3, 4. Stamens, front and back view.
5. The young fig.
6 & 7. The fig cut open, shewing the mass of minute florets.
8. The fig, back view.
9. Scale or bract.
10, 11. Female floret.
12. Ovary cut vertically.
13. Embryo removed from the seed. (Analysis copied from Wight's drawings.)

FICUS TSIALA.

1. Portion of a branch in flower.
2. A receptacle or young fig cut open.
3. A male floret.
4. The same open.
5. The stamens.
6. A female floret.
7. The same open. (Drawn from living specimens.)

Govindo, del.

Dumphy, Lith.

Ficus religiosa. (Linn:)

CYNOMETRA RAMIFLORA. (Nat. order Leguminosæ ; Sub order Cæsalpinieæ ; Tribe Cynometreæ.)

CYNOMETRA, *Linn.*—GEN. CHAR. Calyx-tube obsolete or shortly turbinate, limb of 4 (or 5) segments, imbricate in æstivation, usually reflexed at flowering. Petals 5, subequal, or 2 anterior minute. Stamens 10 (or many), filaments filiform, free or very shortly cohering at base; anthers small, elliptical or rotundate, versatile, dehiscing longitudinally. Ovary sessile or shortly stipitate, style usually filiform, stigma terminal; ovules solitary or geminate. Legume obliquely ovoid obovoid or reniform, turgid or more or less compressed, usually rugose, 2 valved, 1-seeded. Seed exalbuminous ; cotyledons large, fleshy, plano-convex. Unarmed trees or shrubs. Leaves abruptly pinnate, leaflets 1-6-jugate, more or less coriaceous, 1-nerved. Stipules caducous. Flowers small, in axillary or rarely terminal racemes, often very short. Bracts dry or scarious, small, deciduous; bracteoles small sometimes petaloid, persistent.

CYNOMETRA RAMIFLORA. (L.) A middling sized spreading tree, glabrous, leaves abruptly pinnate, leaflets 1-2-pair sessile or subsessile more or less coriaceous oval to elliptic often unequal sided, subacute or obtuse at the apex, 3-6 inches long by $1\frac{1}{2}$-$2\frac{1}{2}$ broad (the upper pair the larger) flowers white or with a tinge of rose in short dense many-flowered axillary racemes or fascicles, bracts short ovate from a broad base, the pedicels 3-4 lines long each furnished at the base with a small lanceolate bracteole, calyx at length reflexed, of 5 broad segments, petals narrow linear equal in size. Stamens 10 alternately shorter, ovary sessile hairy 1-ovuled, stigma capitate, legume very turgid ovoid to reniform very rugose and corrugated. *Linn. Sp. p.* 509 ;—*Rheede. Mal.* 4 *t.* 31.

This tree is, I believe, indigenous in Malabar and Travancore and it inhabits Ceylon. I have never myself met with it in any of our forests, and the drawings are taken from Ceylon specimens ; it is to be found in a cultivated state in gardens in this presidency. The wood possesses great strength and stiffness, and is close grained, hard and durable, but cracks and splits when exposed ; it is of a light brown color and unseasoned weighs 65 *to* 68 *lbs, and* 56 *lbs the cubic foot when seasoned, and its specific gravity is* ·896. *It is in use for house-building, carts, &c., and chips of the wood infused in water give a dark purple dye. C. cauliflora, of which I have also added analysis, is also to be met with in our gardens, but I have not seen it wild.*

Analysis.

1. Branch in fruit (life-size.)
2. Portion of a branch in flower (life-size.)
3. A portion of the inflorescence magnified.
4, 5. Bract and bracteole.
6. A flower bud.
7, 8, 9. Full flowers.
10. A petal.
11. Anther, front view.
12. Anther, back view.
13. The hairy ovary, style and stigma.
14. Ovary cut vertically, 1 ovule. (Drawn from dried specimens.)

CYNOMETRA CAULIFLORA.

1. The truncal inflorescence.
2. A flower bud and bracts.
3. Full flower.
4. Petals.
5. Anther, front view.
6. Anther, back view.
7. Ovary.
8. Ovary cut vertically, 1 ovule.
9. Ovary cut vertically, 2 ovules.
10. Fruit or legume. (Drawn from flowers in spirits.)

Cynometra ramiflora (Linn.)

CYNOMETRA TRAVANCORICA. (Nat. order Leguminosæ; Sub order Cæsalpinieæ; Tribe Cynometreæ.)

For Gen. Char. see letter-press to Pl. cccxv.

CYNOMETRA TRAVANCORICA. (Bedd.) A lofty straight tree with a trunk 5·6 feet in girth, unarmed, glabrous in all its parts, young branches terete, leaves abruptly pinnate, petioles about 3·4 lines long somewhat swollen and corrugated, channelled on the upper surface, leaflets sessile always only 1 pair, elliptic acuminated very unequal sided firm membranaceous to subcoriaceous (when young very membranaceous and of a creamy-pink color), 3-4 inches long by 1-1½ inches broad; racemes axillary shorter than the petiole few flowered densely imbricated before flowering with numerous straw-colored scariose ciliate bracts, pedicels longer than the peduncle, calycine segments 5, petals 5 narrow equal, stamens 10 alternately shorter, ovary glabrous sessile or subsessile 1-ovuled, legume falcate or subreniform apiculate flat and compressed or more or less irregularly convex but not turgid, more or less rugose or corrugate.

This is a late discovery; it is a straight tree of great height and very beautiful foliage, particularly when in young leaf. I have only met with it on the Tinnevelly and Travancore mountains 2000-3000 *feet elevation, but it is most abundant there, particularly in the moist forests about the Parapett and Rosemallay Coffee Estates not far from Courtallum. Nothing is as yet known about its timber, &c., it flowers in September and October; the flowers, with the exception of the glabrous ovary, are quite those of C. ramiflora, but the legume is very different, never being turgid and the leaves differ.*

I have another new species of this genus, a tree from the South Canara ghats, but the inflorescence is only in very young state, and it cannot be described as yet; it has 3 *pair of small leaflets, and the very young racemes are more than an inch long and densely imbricated with the large striated bracts, as in one of Griffith's Malacca species.*

Analysis.

1. A flower bud.
2. A full flower.
3, 4. The same more advanced shewing the 5 broad sepals, 5 narrow petals, 10 stamens alternately shorter, glabrous ovary, style and stigma.
5. Anther, front view.
6. Anther, back view.
7. Ovary cut vertically shewing the solitary ovule.
8, 9. Nearly ripe legumes.

Govindo, del. Dunphy Lith.

Cynometra Travancorica, (Bedd.)

CALLIANDRA CYNOMETROIDES. (Nat. order Leguminosæ; Sub order Mimoseæ; Tribe Ingeæ.)

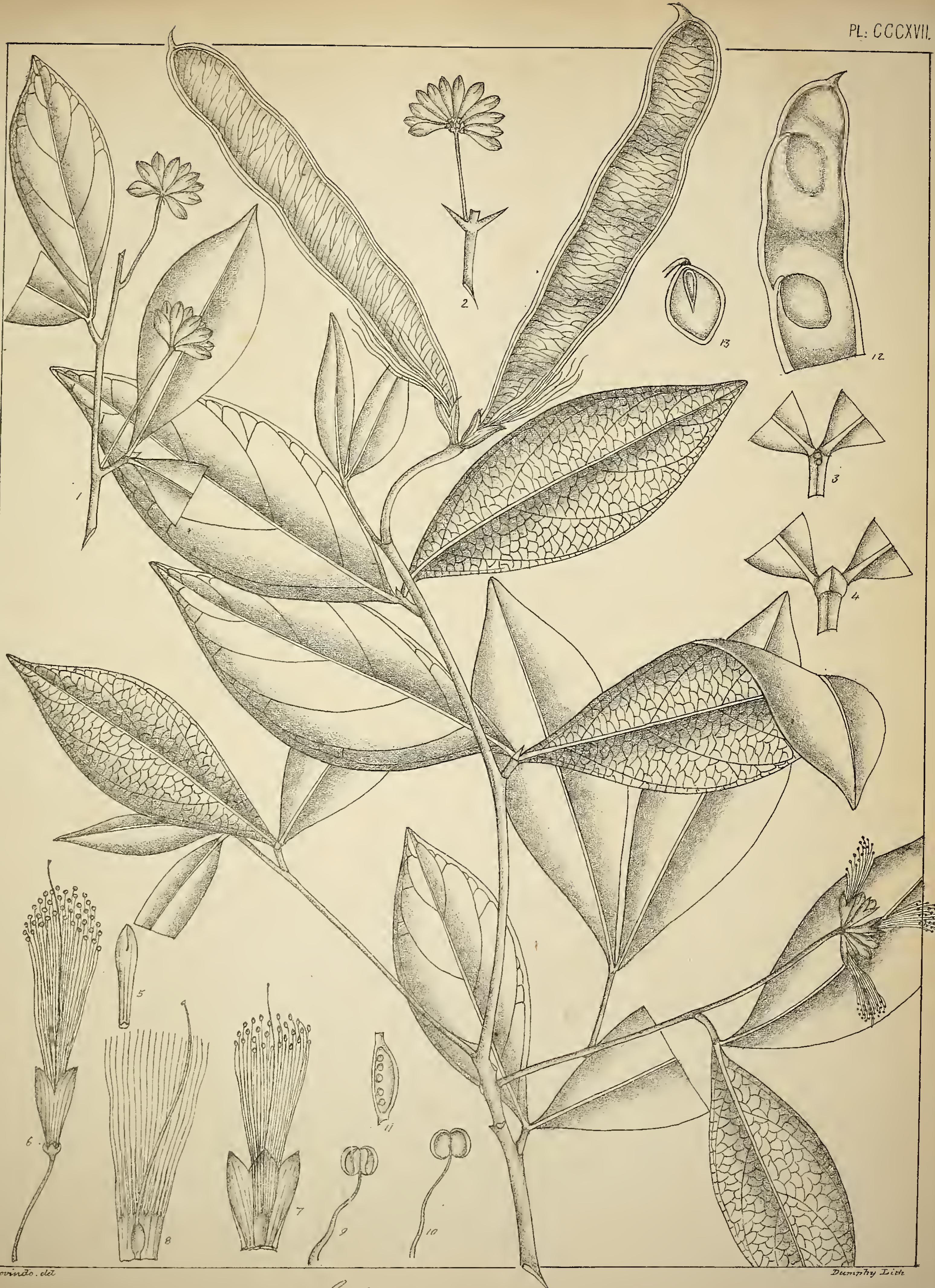
CALLIANDRA, *Benth.*—GEN. CHAR. Flowers polygamous or hermathrodite. Calyx campanulate 3-5-6-toothed or rarely deeply parted, corol infundibuliform or campanulate, petals 3-5-6 valvate and joined up to or above the middle. Stamens numerous (10-100) connate into a tube at the base, long exserted, anthers minute, glandularly-hairy or glabrous, the pollen sticking together in 2-4 masses in each cell, ovary sessile or subsessile, many-ovuled, style filiform, stigma terminal small capitate, legume linear straight or scarcely falcate, often narrowed at the base compressed flat, the margins thickened and subterete 2-valved, the valves dehiscing elastically from the apex to the base and not twisting and without pulp inside. Seed obovate or sub orbicular compressed, funicle short. Trees or shrubs, armed or unarmed, leaves bipinnate or rarely pinnate, flowers red or white on axillary solitary peduncles or in terminal racemes. *Benth. in Hook. Journ. of Bot,* ii. 138. Anneslea, *Salisb. Parod. Lond, t.* 64, not *Wall.*

CALLIANDRA CYNOMETROIDES. (Bedd.) A middling sized glabrous tree, trunk and boughs generally thorny at least when young, leaves abruptly pinnate, petioles 3-8 lines long, leaflets sessile 1 pair with a hollow gland between them at the apex of the petiole on the upperside and a stipel on the under side, elliptic often very unequal sided subacute or obtusely pointed at the apex, 3-4 inches long by 1-1½ inches broad, penniveined and prominently reticulated, from membranaceous to sub-coriaceous, stipules when present thorny short straight, peduncles axillary solitary 1-1½ inches long with 5-12 sessile flowers at the apex, calyx very small 3-toothed, petals 3 adnate for more than ⅔rds of their length, stamens numerous much exserted joined into a tube at the base and with the corol more or less persistent in fruit, stigma small orbicular, legume flat coriaceous reticulated 4-5 inches long by about 8 lines broad, the margins much thickened and terete, the apex with a prominent hook, seeds 5-6 brown rather shining, rhomboid in shape, funicle conspicuous.

This interesting tree has only lately been discovered on the Tinnevelly and Travancore mountains 25000 *feet elevation (dense moist forests about the Rosemallay Coffee Estate not far from Courtallum), in flower and ripe fruit in November ; the timber appears to be very good as in most of the family. The genus is a large one, but all the species are American, except one other (the C. umbrosa, Wall) which is found in North India. The species here described differs from all in having pinnate instead of bipinnate leaves, and in its flowers being trimerous. Seed has been supplied to the Bangalore, Calcutta, Madras and Ceylon Botanical Gardens.*

Analysis.

1. Portion of a branch shewing the peduncles in bud.
2. The thorny stipules.
3. Apex of the petiole, front side shewing the hollow gland between the leaflets.
4. Back view of the apex of the petiole, shewing the stipel which is deciduous.
5. A flower bud.
6. A full flower shewing the numerous much exserted stamens.
7. Corol opened, petals 3, joined for more than ⅔rds of their length.
8. Stamen tube opened, filaments connate into a tube at the base, ovary on a very short stipe.
9. Anther, front view.
10. Anther, back view.
11. Ovary cut vertically shewing 5 ovules.
12. Portion of a legume after it has burst, shewing 2 of the rhomboid seeds attached by their funicles.
13. A seed cut through vertically. (Drawn from living specimens.)



Govindo. del.

Dumphy Lith.

Calliandra cynometroides, (Bedd.)

SARCOCEPHALUS CORDATUS. (Nat. order Rubiaceæ.)

SARCOCEPHALUS. *Afzel.*—GEN. CHAR. Flowers densely packed in a globular head, the calyxes cohering, corol-tube slender, lobes 4-5 spreading imbricate in the bud, anthers nearly sssile in the mouth of ths tube ; ovary 2-celled with numcrous (or few) imbricate ovules in each cell attached to ths axis above ths middle or near the apex, styls much exserted, stigma entire or 2-lobed. Seed sssile connate into a dense globular apple-like mass, fleshy when fresh, hard when dry, but capsular at the base ; seeds numerous (or few) in each cell not winged, scrobiculate attached to the axis by fleshy gland like proccsses, at first all pendulous, ths upper ones at length erect, albumsn copious. Trees, stipules large membranous very deciduous the globular flower heads solitary terminal.—Platanocarpum, *Korth.* Nauclea, *in part Roxb.*

SARCOCEPHALUS CORDATUS. (Roxb.) A good sized tree, leaves subcoriaceous to coriaceous, softly and very finely pubescent on both sides but more so beneath (pubescence more or less stellate) ovate or almost orbicular, ovato-oblong or cordate obtusely rounded at the apex, cuneate or cordate at the base, entire, 4-12 inches long by $2\frac{3}{4}$ to $8\frac{1}{2}$ inches broad, penniveined, primary veins prominent compressed above much raised beneath, stipules large broad ovate obtuse pubescent, petioles 6-12 lines long, flowers 4-5-merous yellowish, very fragrant, in dense globular terminal heads about 1 inch in diameter, calyx-segments very short gland-like clavate and emarginate, corol-tube slender $2\text{-}2\frac{1}{2}$ lines long, lobes obtuse, anthers on very short filaments, style twice as long as the corol tubes, stigma large ovoid and the apex nearly entire or somewhat 2-lobed, ovules very numerous and imbricate in each cell pendulous from above the middle of the partition. Seed receptacles united into a fleshy apple-like globular mass more than 1 inch in diameter, at first much pitted and rough with the remains of the calyxes, smoother in age, seeds numerous in each cell scrobiculate attached to fleshy gland like processes, at first all pendulous much imbricate, when tho fruit is fully ripe the upper ones become erect.—Nauclea cordata, *Roxb. Fl. Ind.* i. 508. Sarcocephalus cordatus, *Miq. Fl. Ind. Bat.* ii. 133. Nauclea coadunata, *Sm. in Rees. Cycl.* xxiv ;—*DC. Prod.* iv. 344.

9

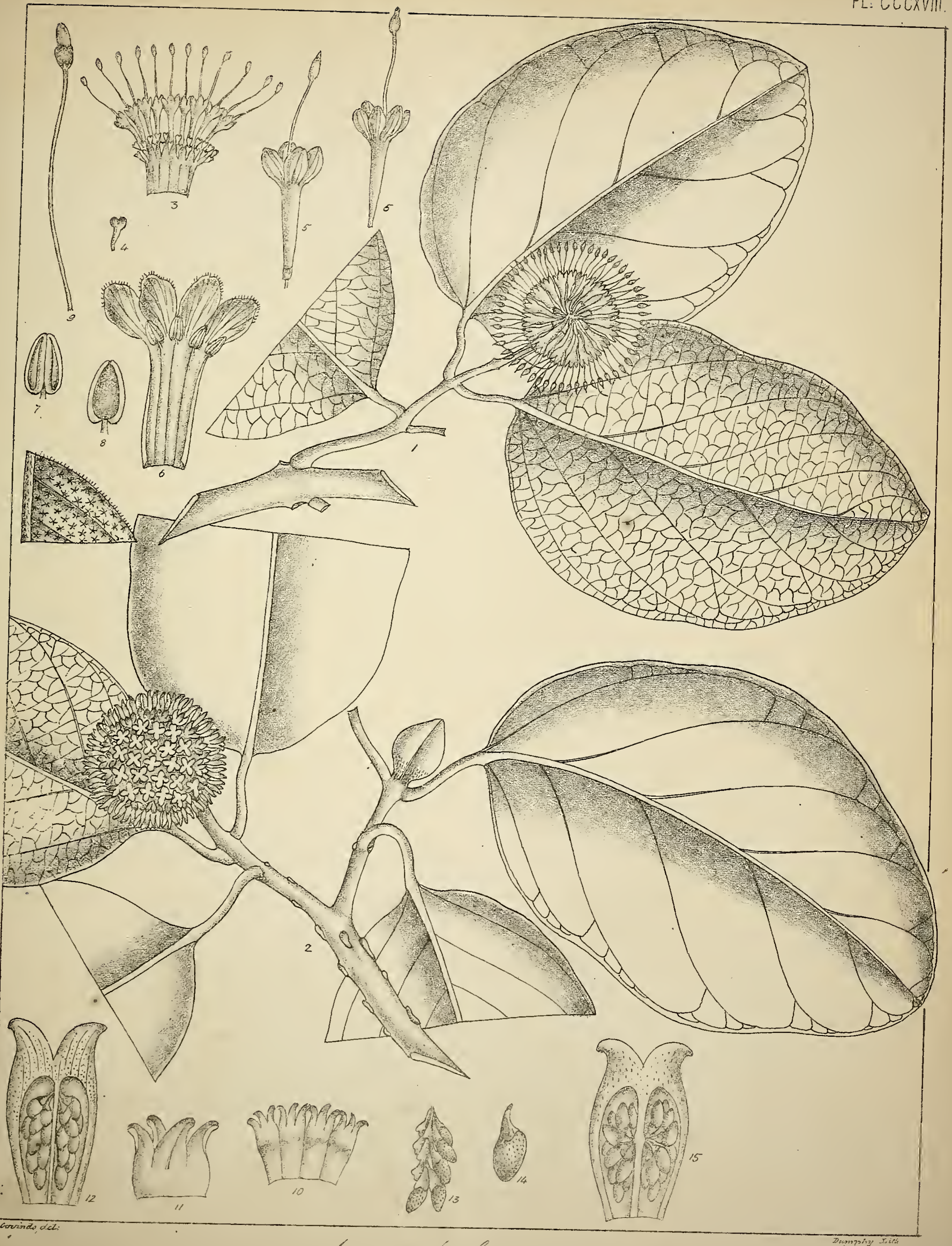
This tree is very common in the southern parts of Ceylon at no elevation, growing on the banks of streams, and is known by the name of Bakmee ; it flowers in May and June ; the wood is light and tough and in use for sandals, common furniture, doors, &c. The Australian tree described under this name in Bentham's Fl. Aust. iii. p. 402 *must be a different species if the seeds are as described, solitary or* 2 *superposed; the size of the plate did not allow of my figuring the larger cordate leaves, which are often about* 1 *foot long and upwards of* 8 *inches broad.*

Analysis.

1. A branch in flower.
2. A branch with nearly ripe fruit.
3. A portion of a head of flowers shewing calyxes and corols.
4. Ons of the clavats segments of the calyx.
5. A 4-lobed and 5-lobed corol, the lobes imbricate.
6. A 4-lobed corol opsn, shewing ths 4 nearly sessile stamens in the mouth of the tube and alternate with the segments.

7 & 8. Anther, front and back view.

9. Style and stigma.
10. A portion of ths dense globular mass of connats seed vessels which grow together into a globular fleshy fruit crowned by the remains of the calyxes and disks.
11. Apcx of a young seed vessel.
12. Young seed vessel cut vertically, 2-celled, seeds numerous imbricate attached at the apex to fleshy glands which ars more or less pendulous from above ths middle of the axis.
13. The mass of young seeds and glandular appendages removed from the cell.
14. A nearly ripe seed (scrobiculats.)
15. Vertical section of a ripe seed vessel shewing soms of the seeds directed upwards. All drawn from fresh specimens in spirits collected at Badagam in Ceylon, cxcspt No. 15, which is from a dried specimen communicated by Dr. Thwaites.



Govindo, del.

Dunphy Lith.

Sarcocephalus cordatus, Roxb.

SANDORICUM INDICUM. (Nat. order Meliaceæ.)

SANDORICUM, *Cav.*—GEN. CHAR. Calyx cupular, the tube adnate with the base of the ovary, the limb shortly 5-lobed, petals 5 free oblong obtuse imbricate, staminal tube cyliudric 10-toothed at the apex, anthers 10 included, disk tubular 5-toothed or irregularly 8-10 toothed sheathing the ovary and base of the style, ovary immersed in the base of the calyx 5-celled atteuuated iuto the style, style clavate above and surrounded by a thickened ring, stigmas 5 thick erect with the apices recurved; ovules 2 in each cell collaterally pendulous from near the apex of the cell, berry superior globose fleshy indehiscent 3-5-celled, cells 1-seeded, the partitions obliterated at maturity. Seeds arillate, arillus parchment like, pulpy on the outside, testa brown polished spongy, cotyledons very thick collateral, radicle superior. Trees, glabrous or tomentose, leaves 3-foliate, panicles axillary, flowers small crowded, fruit apple like acid edible. *Cav. Diss.* vii. 359, *t.* 202-3.

SANDORICUM INDICUM. (Cav.) A good sized elegant tree with a dense globular head, bark smooth greenish, young shoots downy, leaves alternate trifoliate about a foot long, the petiole being 3-4 inches, leaflets ovate entire in age glabrous above slightly downy beneath, 5-7 inches long by 3-4 broad, penniveined, the lateral petiolules about 3 lines long, the terminal one 1-1½ inches long, panicles finely downy axillary from shorter to a little longer than the leaves, bracts lanceolate, flowers numerous small yellow, calycine segments rounded downy, petals linear oblong, disk irregularly and minutely 8-10 toothed. Anthers sessile, fruit a nearly round berry about the size of a small orange slightly villous yellow when ripe. *Roxb. Fl. Ind.* ii. 393. Trichilia nervosa, *Vahl.* T. venosa, *Spr.* Melia koetjape, *Burm.*

This tree is an introduction from the Moluccas, but is met with in a cultivated state throughout India, Birmah and Ceylon; it flowers in January and February, and the fruit ripens in the rainy season. The timber is white colored and in use for building purposes; the fruit is eaten and made into jelly. The root is bitter and used medicinally.

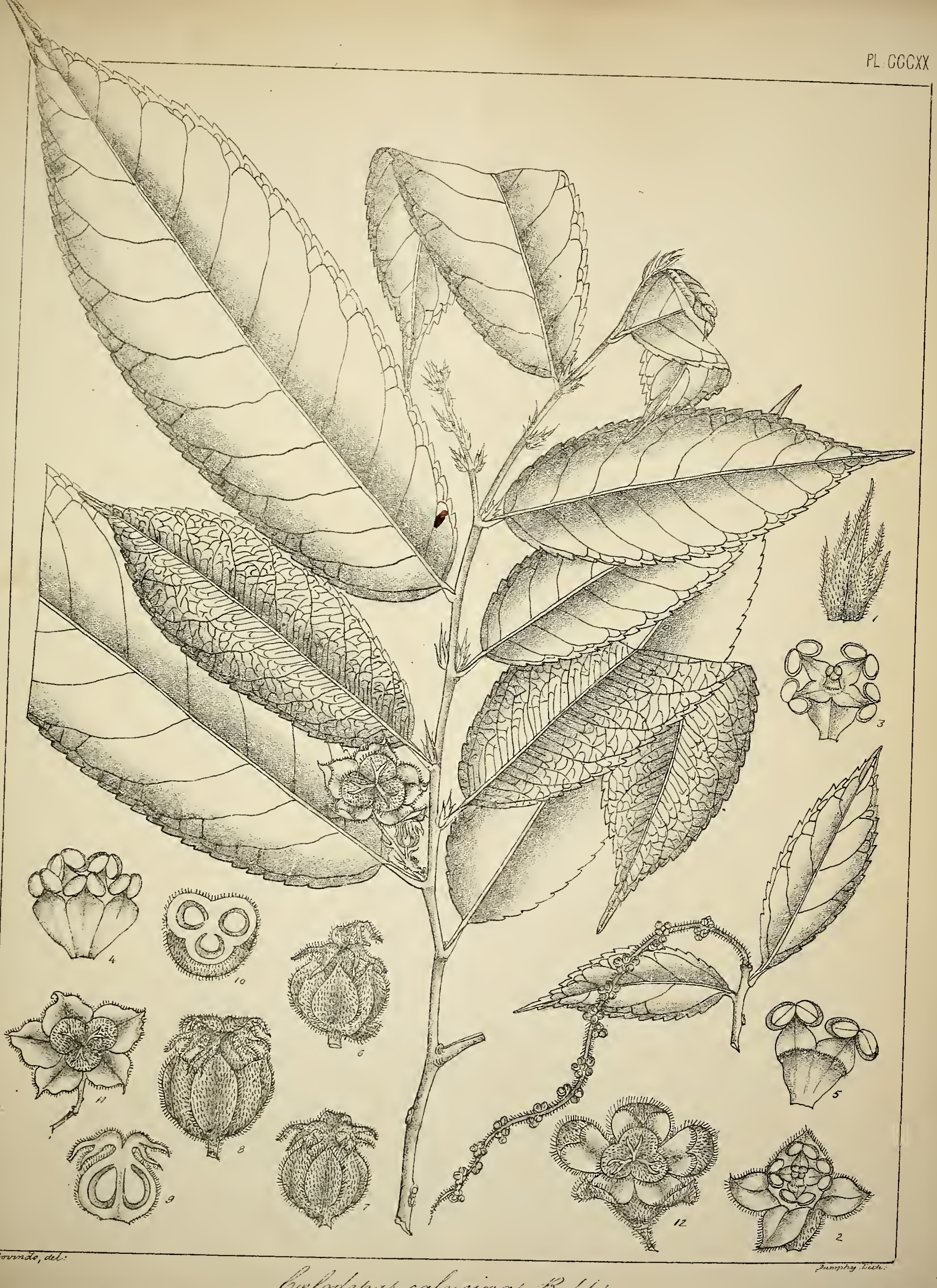
Analysis.

1. Portion of the inflorescence magnified.
2. A flower bud, petals imbricate.
3. A full flower.
4. The same, petals removed.
5. A petal.
6. Inside view of stamen tube shewing the 10 anthers.
7. Outside view of the same.
8. An anther, front view.
9. An anther, back view.
10. Ovary, style and the 5 stigmas, the ovary surrounded by a disk.
11. The irregularly toothed disk removed.
12. Ovary cut vertically, ovules pendulous.
13. Ovary cut transversely, shewing the 5 cells, each 2 ovuled.

D Govendo del:

Dunphy Lith

Sandoricum Indicum (Cav.)



Govindo, del.

Dunphy Lith.

Coelodepas calycina, (Bedd.)

Govindo Del.

Dumphy Lith.

Bambusa arundinacea, ! Retz !

See Manual under Bambuseæ.

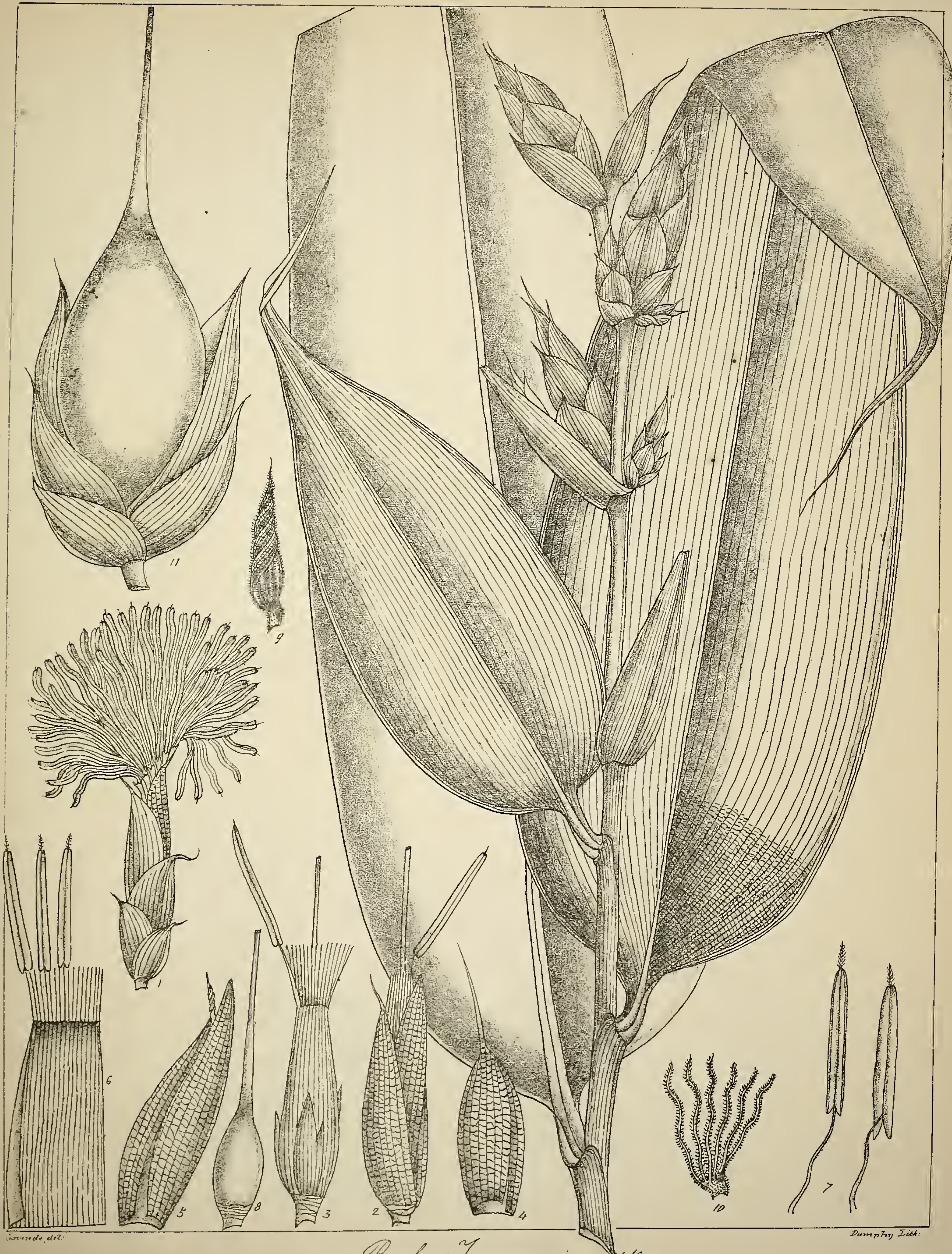
Govindo del.

Dunphy Lith.

Oxytenanthera Thwaitesii (Munro.)

Gvende, del. Dumphy. Lith.

Teinostachyum Wightii (Munro)



Lounde, del. Dunphy Lith.

Beesha Travancorica. Bedd

See Manual under Bambuseæ:

PL: CCCXXV.

Govindo del. Dunphy Lith.

Dendrocalamus strictus.

Govindo del — Dunphy Lith:

Byrsophyllum tetrandrum (Bedd.)

See Manual under Rubiaceæ.

Govindo del. Dumphy Lith.

Octotropis Travancorica (Bedd.)
See Manual under Rubiaceæ.

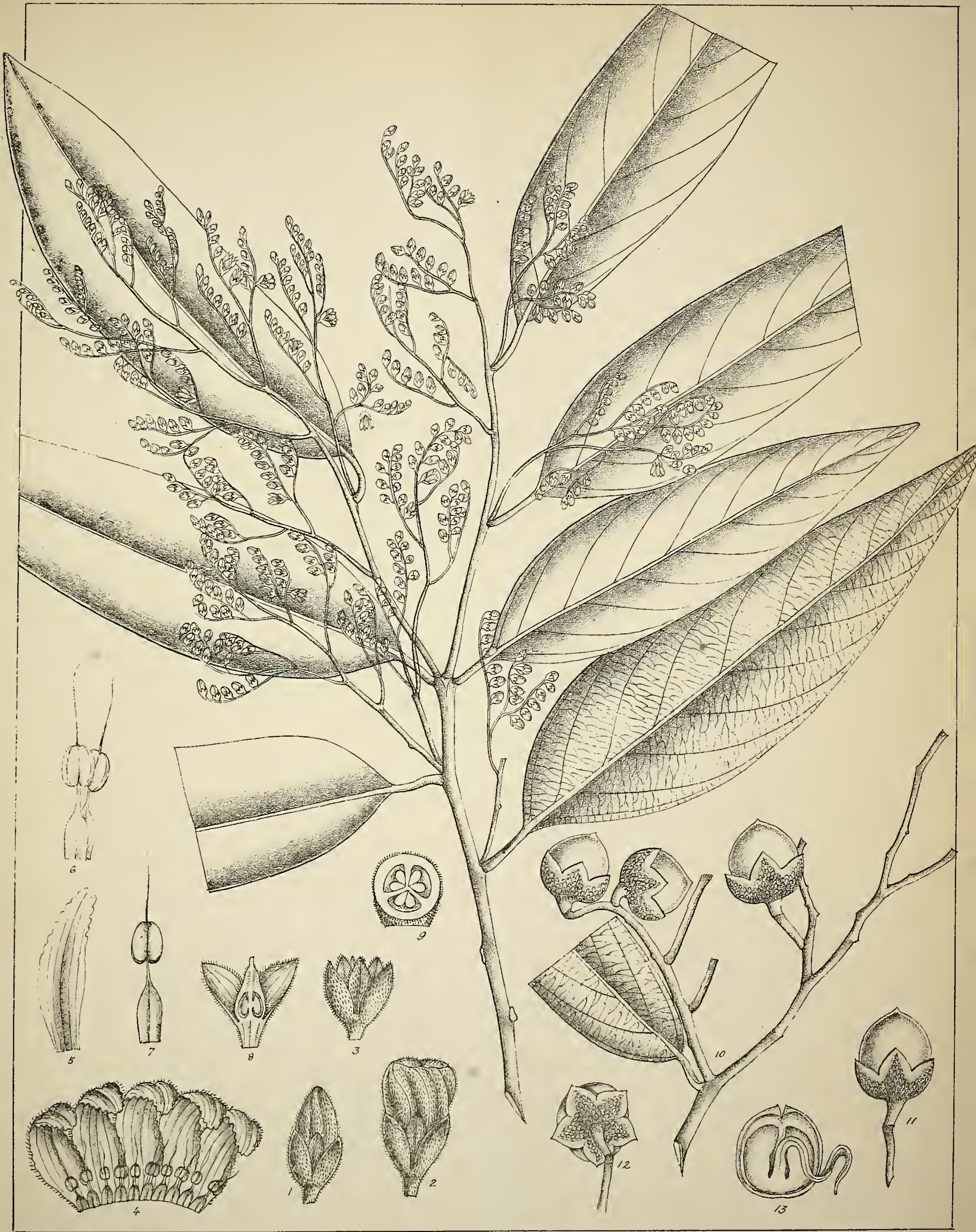
Conrado del. Dumphy Lith.

Nargedia macrocarpa (Thw.)

PL. CCCXXIX.

Balanocarpus erosa (Bedd.)

See Addenda to Manual.



Govinda del.

Dunphy Lith.

Balanocarpus utilis (Bedd.)

See Addenda to Manual